DEPOSITIONAL SYSTEMS IN THE QUEEN CITY FORMATION (EOCENE) CENTRAL AND EAST TEXAS

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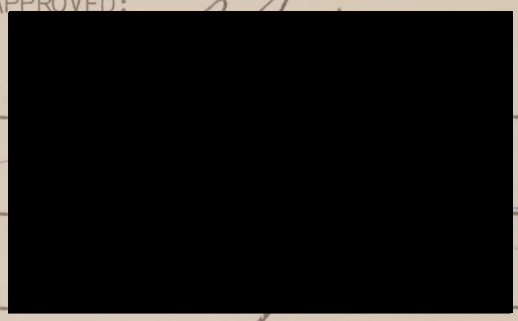

DEPOSITIONAL SYSTEMS IN THE QUEEN CITY FORMATION (EOCENE) CENTRAL AND EAST TEXAS

by

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THESIS

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PREFACE

Several people made possible the completion of this study. I am deeply indebted to Dr. W. L. Fisher, supervising professor, who suggested the project, guided me throughout it, and was always prompt with advice; and to Doctors A. J. Scott and R. O. Kehle, who kindly participated in my thesis committee and made helpful suggestions in several phases of the work.

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I am most grateful for the generous support of Compania Shell de Venezuela, Ltd., which gave me a leave of absence from the Exploration Department, a full scholarship, and a special grant for expenses related to this thesis.

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Abstract

Surface and subsurface studies between the San Marcos-Guadalupe and Sabine Rivers indicate that terrigenous clastic sequences in the Queen City Formation accumulated as part of a high-constructive, lobate delta system. Principal facies in outcrop are delta front and delta plain; chief facies in subsurface are delta front and prodelta. Facies distribution, composition, and size of the deltas are similar to certain lobes of the Holocene Mississippi Delta; and Gulf Coast Basin Eocene deltas in the lower part of the Wilcox Group, and in the Jackson Group and Yegua Formation. Five major lobes of the high constructive or Mississippi type are developed in the Queen City Delta System between the Colorado and Angelina Rivers.

Deltas of the Queen City Formation prograded gulfward over shelf muds, glauconites, and marls of the Reklaw Formation; they are overlain by comparable shelf facies of the Weches Formation. Deltaic facies of the Queen City Formation wedge out in Nacogdoches and Angelina Counties; shelf sediments of the Reklaw and Weches Formations merge to become the Cane River Formation of western Louisiana. A minor amount of oil and gas has been produced from delta front and distributary channel sand facies of the Queen City Delta System.

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INTRODUCTION

This thesis reports the sedimentary facies and depositional systems present in the Queen City Formation and in parts of adjacent stratigraphic units of the Claiborne Group (Middle Eocene) in the upper part of the Texas Coastal Plain. The Queen City Formation is one of several terrigenous clastic wedges that filled the Gulf Coast Basin by progressive offlap; it is made up of sands and muds bounded by regionally persistent glauconitic and marly muds of the overlying Weches and underlying Reklaw Formations.

Location

The region studied includes the outcrop and subsurface extent of the Queen City Formation in Central and East Texas, an area of approximately 16,000 square miles (Fig. 1); it is bounded by the San Marcos-Guadalupe River on the southwest, and by the Sabine River on the northeast. Outcrops of the Queen City Formation extend through Caldwell, Bastrop, Lee, Robertson, Leon, Freestone, Anderson, Henderson, Smith, Wood, Upshur, Harrison, Gregg, Rusk, Cherokee, and Nacogdoches Counties. Subsurface extent of principal sands in this stratigraphic unit ranges from 40 to 70 miles downdip from outcrop, including all or part of Gonzales, Lavaca, Colorado, Fayette, Bastrop, Lee, Burleson, Washington, Austin, Waller, Grimes, Brazos, Robertson, Leon, Madison, Walker, Montgomery, San Jacinto, Polk, Trinity, Houston, Anderson, Henderson, Cherokee, Nacogdoches,

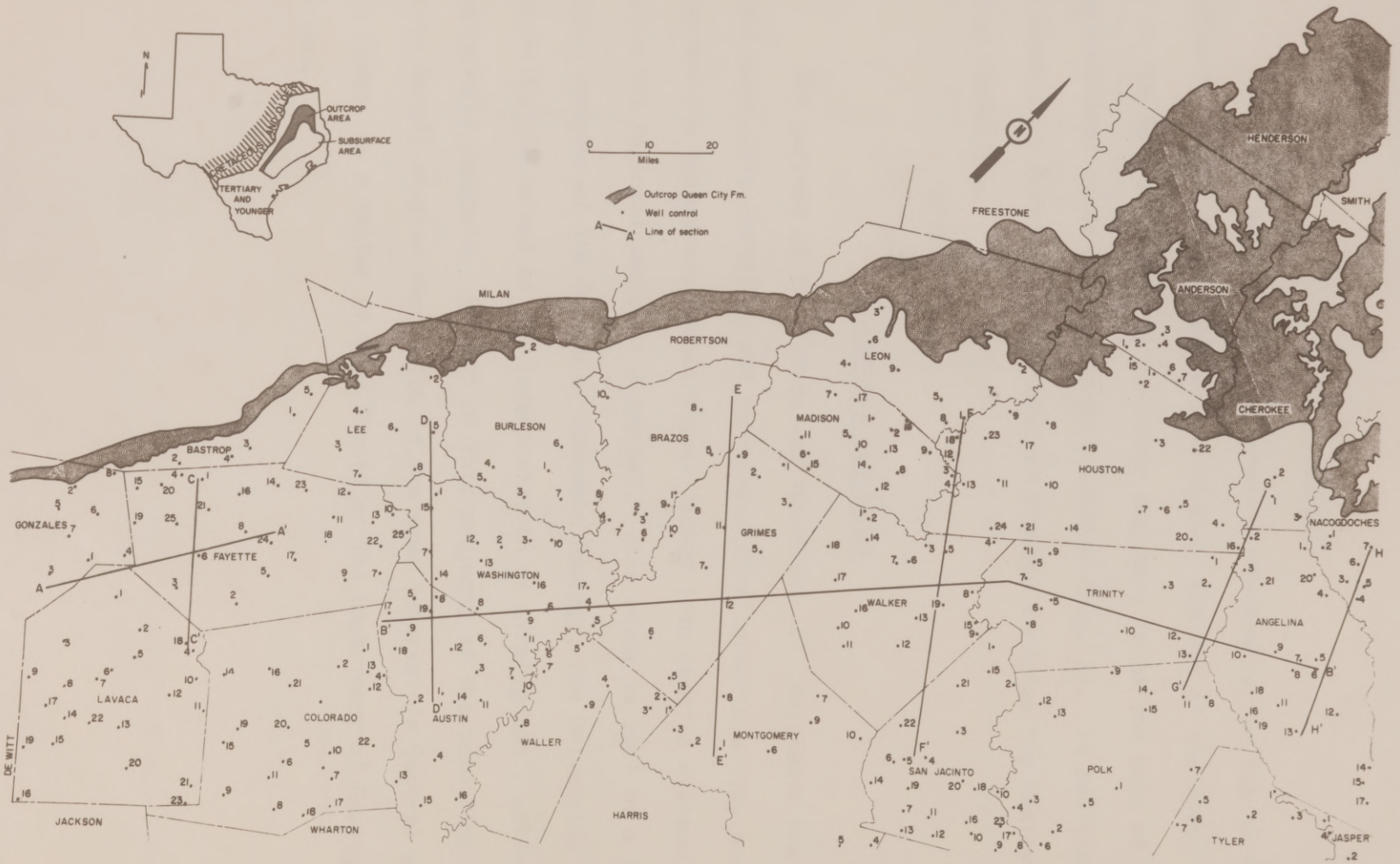

Figure 1. Index to well locations and stratigraphic sections. Numbers refer to wells in appendix.

and Angelina Counties.

Interval Studied

The lower boundary of the interval studied is the top of the Carrizo Formation (Wilcox Group), or locally the top of the Newby Member of the Reklaw Formation; the upper boundary is at the base of the progradational sands of the Sparta Formation (Fig. 2). In addition to the Queen City Formation, the interval studied includes the Reklaw and Weches Formations.

Purpose and Scope

The purpose of this study was two-fold: 1) delineate the facies in the Queen City Formation and associated stratigraphic units; and 2) integrate the interpreted depositional facies into genetic systems and outline the regional sediment dispersal. This study is part of a basin analysis program of the Bureau of Economic Geology, The University of Texas at Austin, aimed at the interpretation of stratigraphic units using genetic concepts. As part of this project, at the same time Mr. Roberto Garcia studied the facies in the same interval in Central and South Texas, as a Master of Arts Thesis at the Department of Geological Sciences.

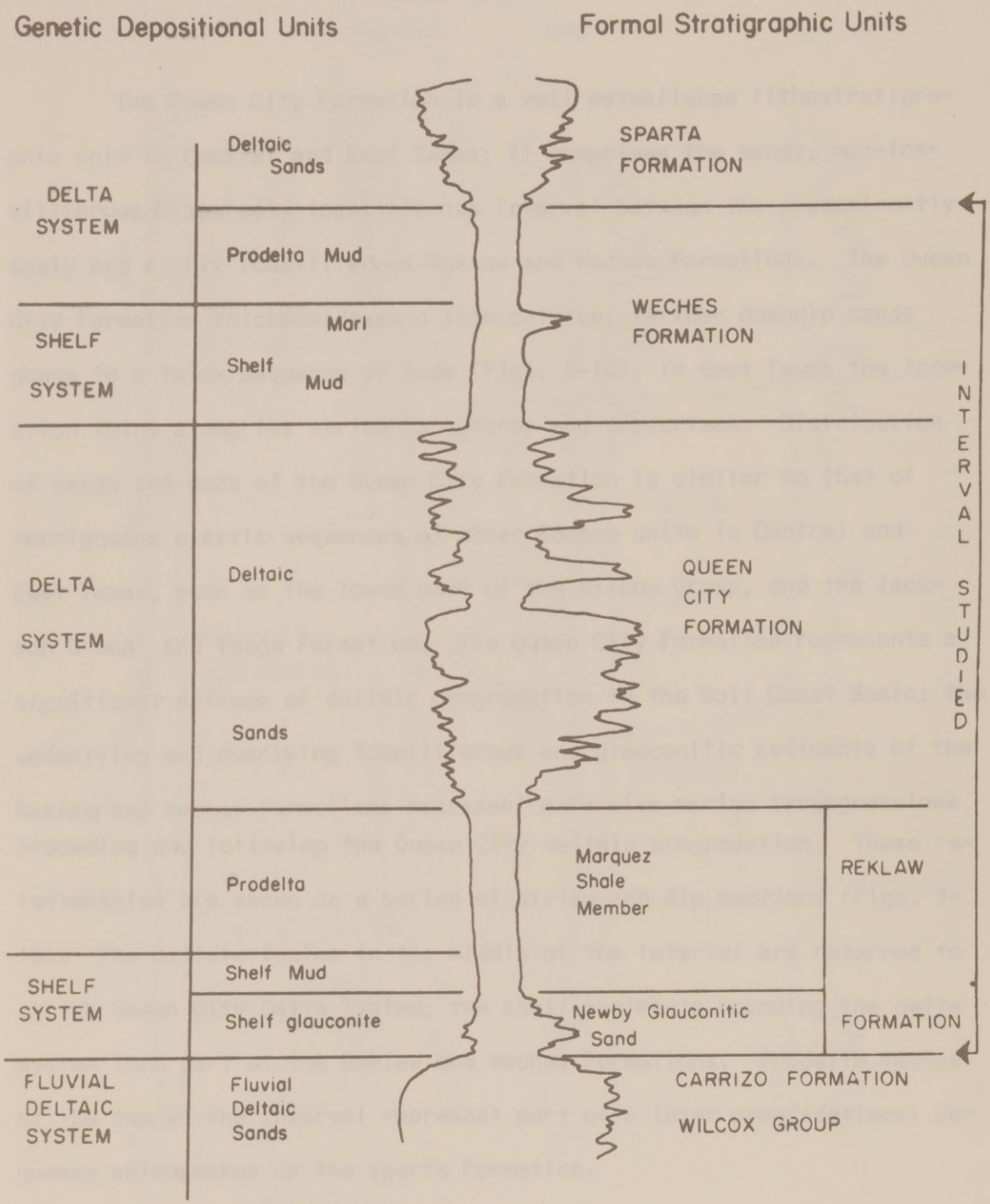

Figure 2. Idealized electric-log of the interval studied and relationship between genetic and formal stratigraphic units.

DEPOSITIONAL UNITS

The Queen City Formation is a well established lithostratigraphic unit in Central and East Texas; it comprises the sandy, non-fossiliferous to sparsely fossiliferous interval between the predominantly shaly and richly fossiliferous Reklaw and Weches Formations. The Queen City Formation thickens downdip from outcrop; farther downdip sands grade to a thick sequence of muds (Figs. 5-10); in East Texas the formation thins along the strike in outcrop and subsurface. Distribution of sands and muds of the Queen City Formation is similar to that of terrigneous clastic sequences of other Eocene units in Central and East Texas, such as the lower part of the Wilcox Group, and the Jackson Group and Yeuga Formation. The Queen City Formation represents a significant episode of deltaic progradation in the Gulf Coast Basin; the underlying and overlying fossiliferous and glauconitic sediments of the Reklaw and Weches Formations represent extensive marine transgressions preceding and following the Queen City deltaic progradation. These relationships are shown on a series of strike and dip sections (Figs. 3-10). The deltaic facies in the middle of the interval are referred to as the Queen City Delta System; the shelf sediments bounding the delta system form part of the Reklaw and Weches Formations. Prodelta facies at the top of the interval represent part of a later progradational sequence which makes up the Sparta Formation.

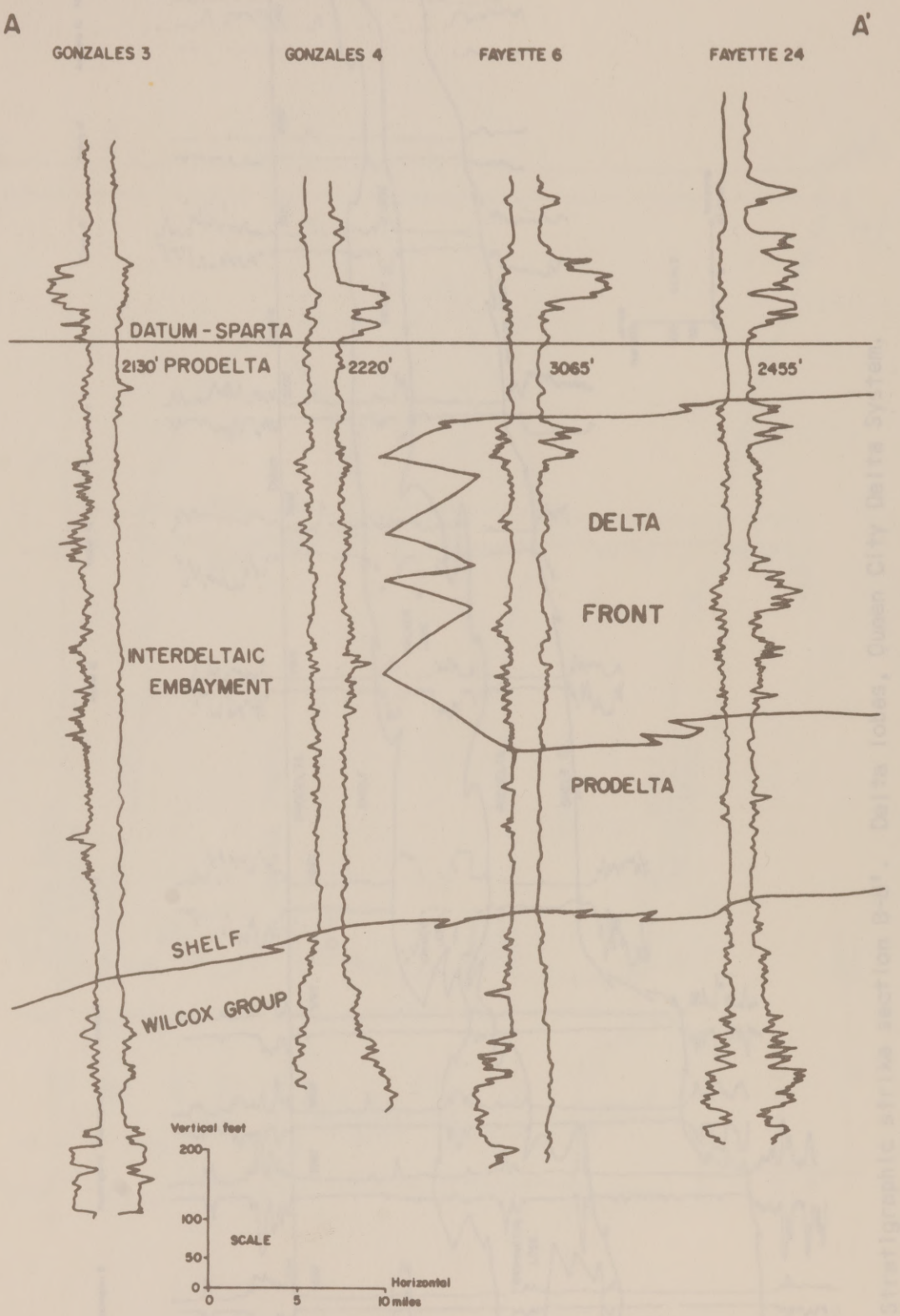

Figure 3. Stratigraphic section A-A', Queen City Formation. Marginal deltaic facies in the interdeltaic embayment, Central Texas. Location on Figure 1.

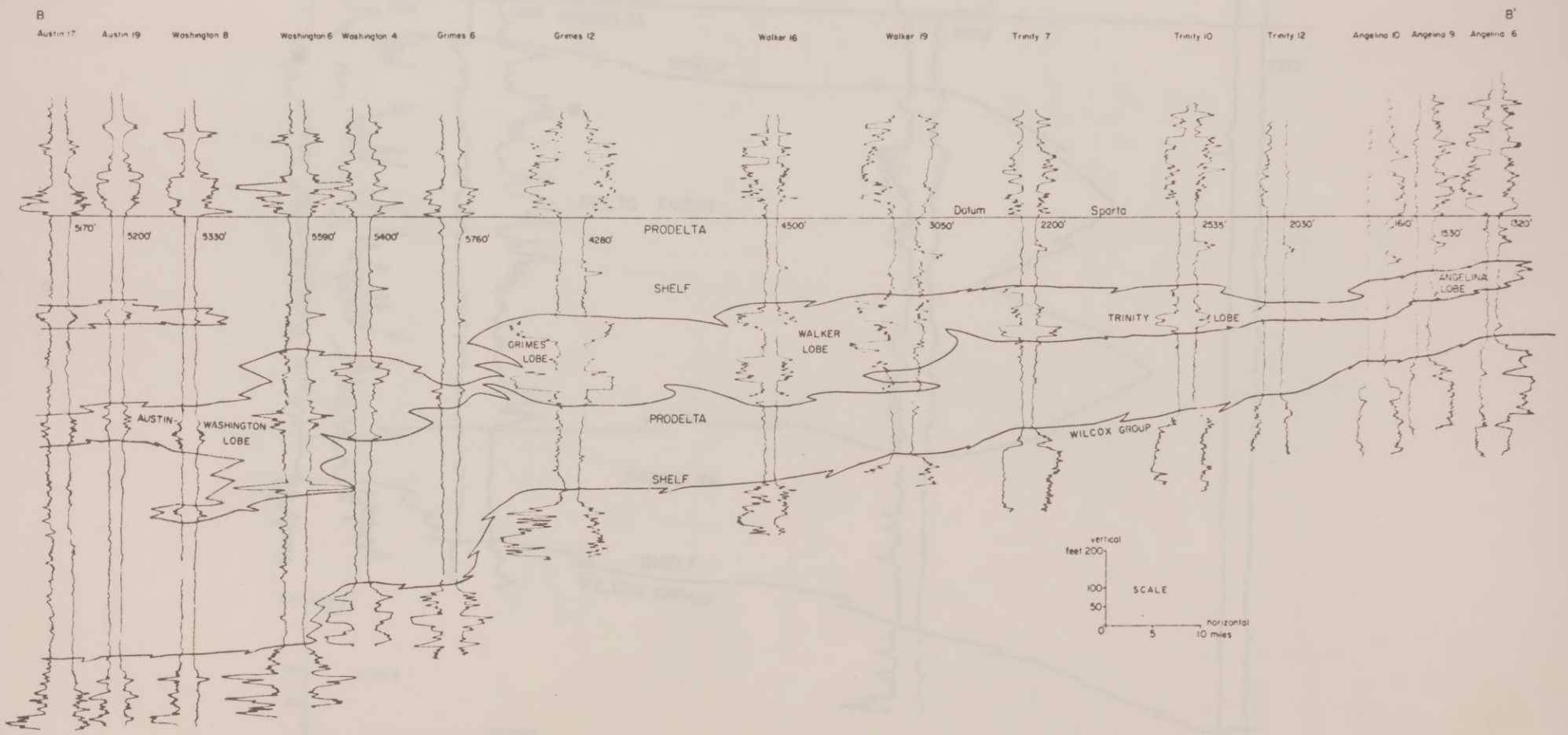

Figure 4. Stratigraphic strike section B-B'. Delta lobes, Queen City Delta System. Location on Figure 1.

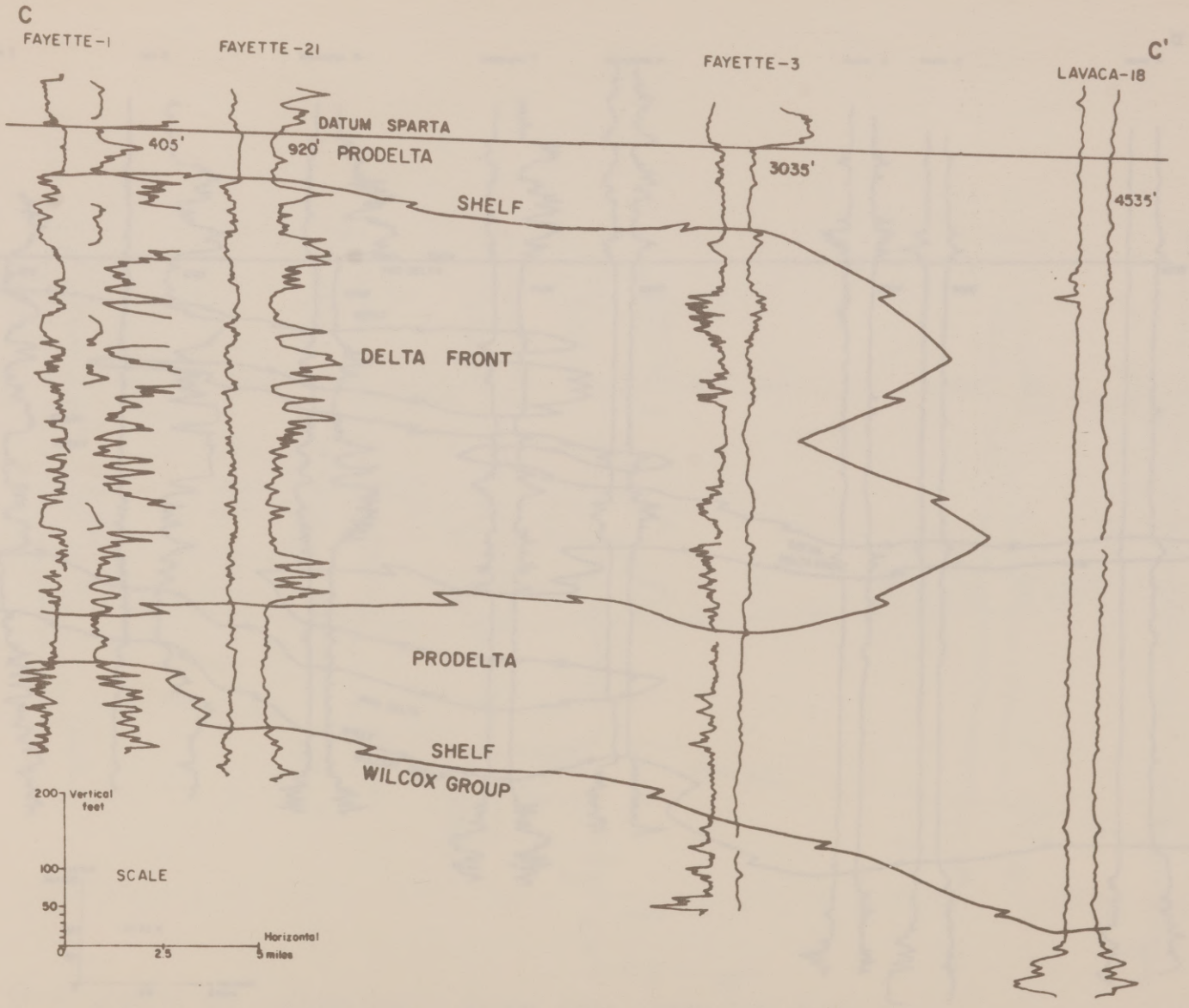

Figure 5. Stratigraphic dip section C-C', Queen City Formation. Delta front facies bounded by shelf-prodelta muds grade downdip to prodelta muds. Location on Figure 1.

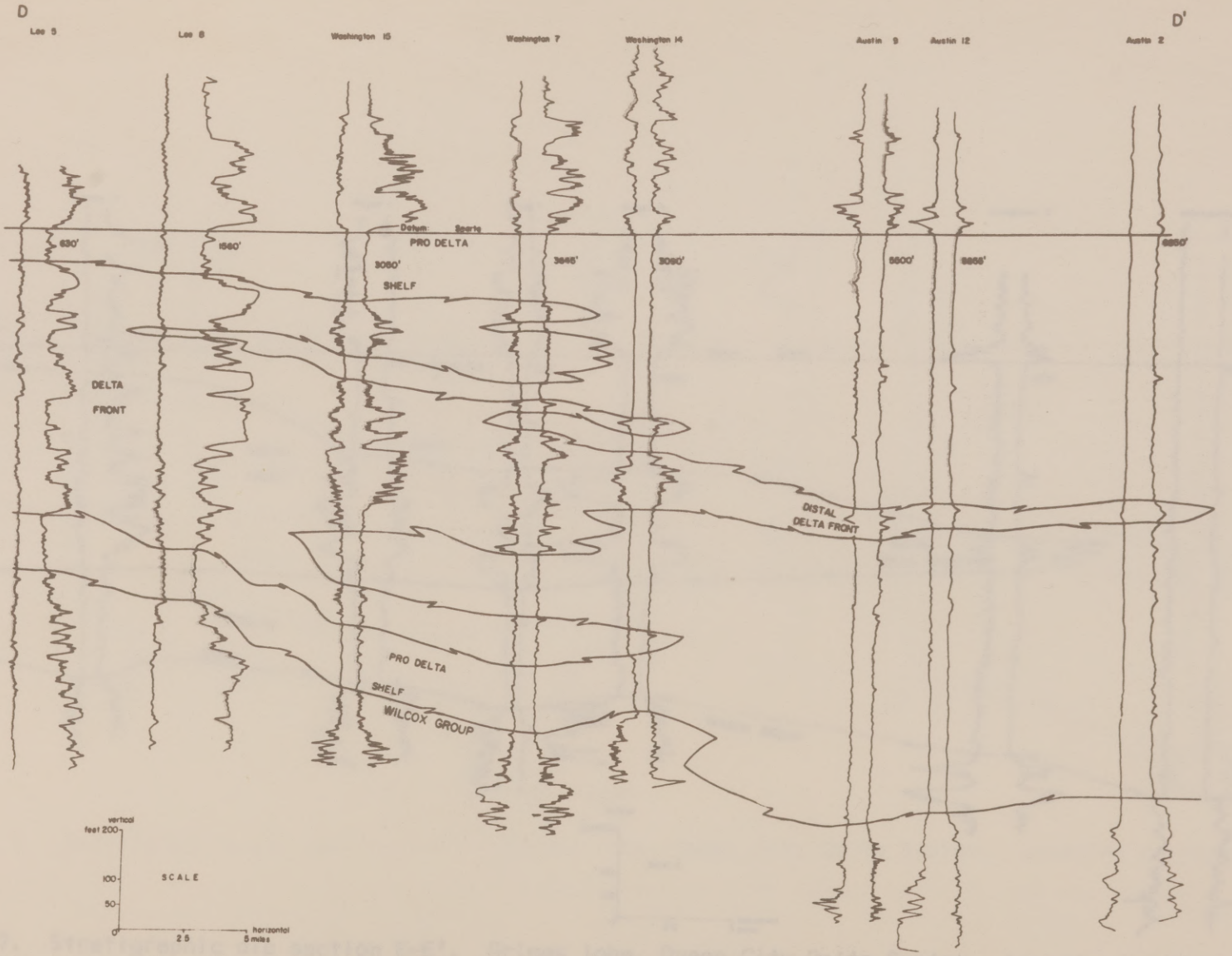

Figure 6. Stratigraphic dip section D-D'. Austin-Washington lobe, Queen City Delta System. Location on Figure 1.

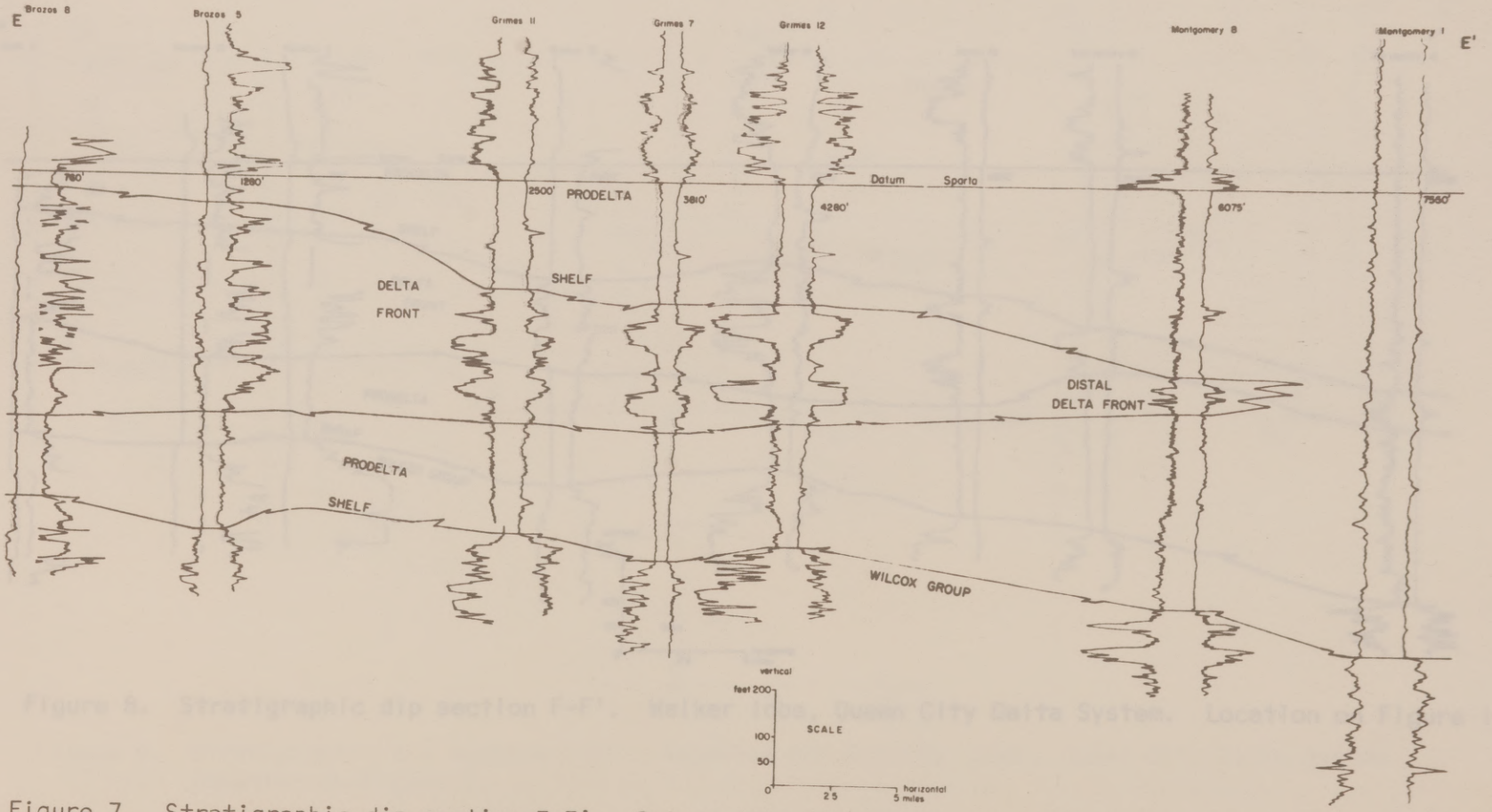

Figure 7. Stratigraphic dip section E-E'. Grimes lobe, Queen City Delta System. Location on Fig. 1.

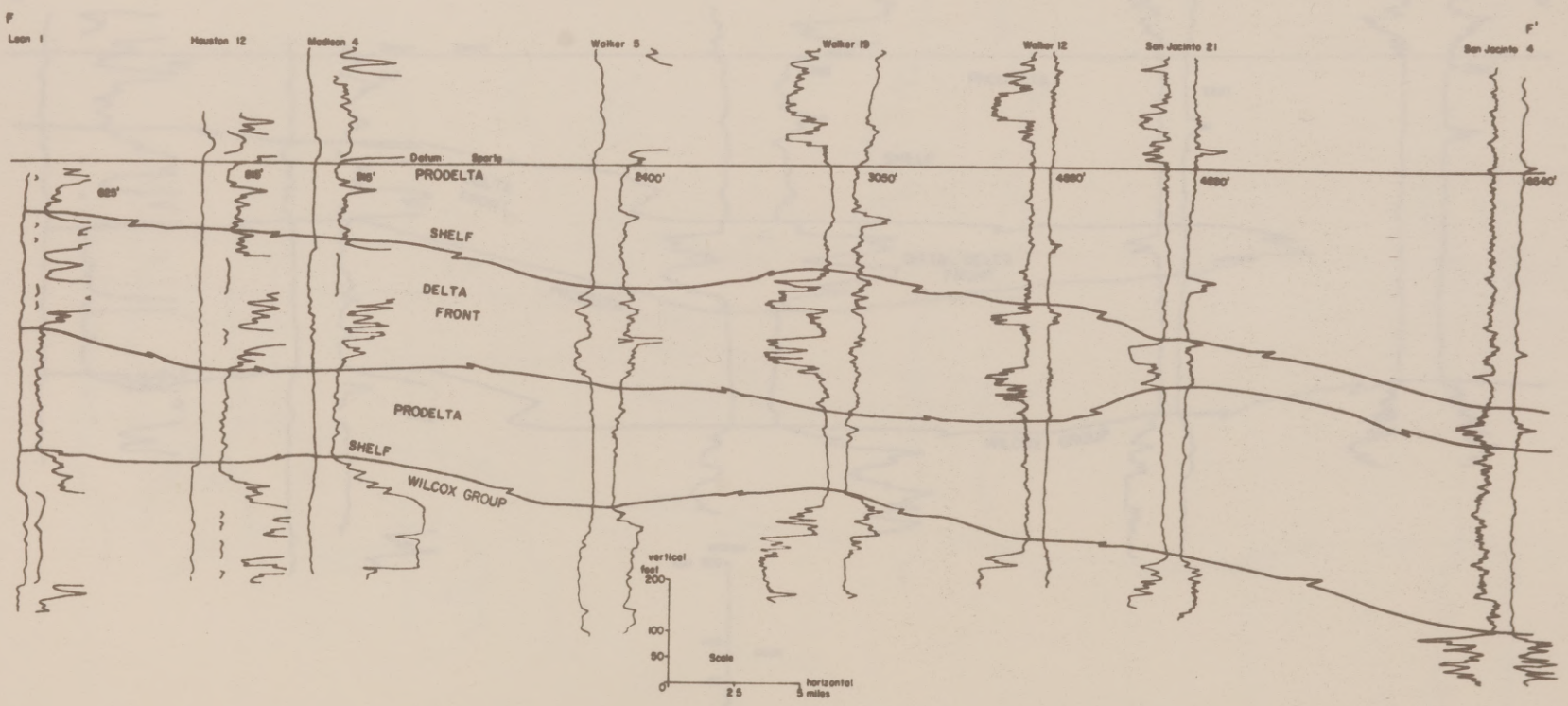

Figure 8. Stratigraphic dip section F-F'. Walker lobe, Queen City Delta System. Location on Figure 1.

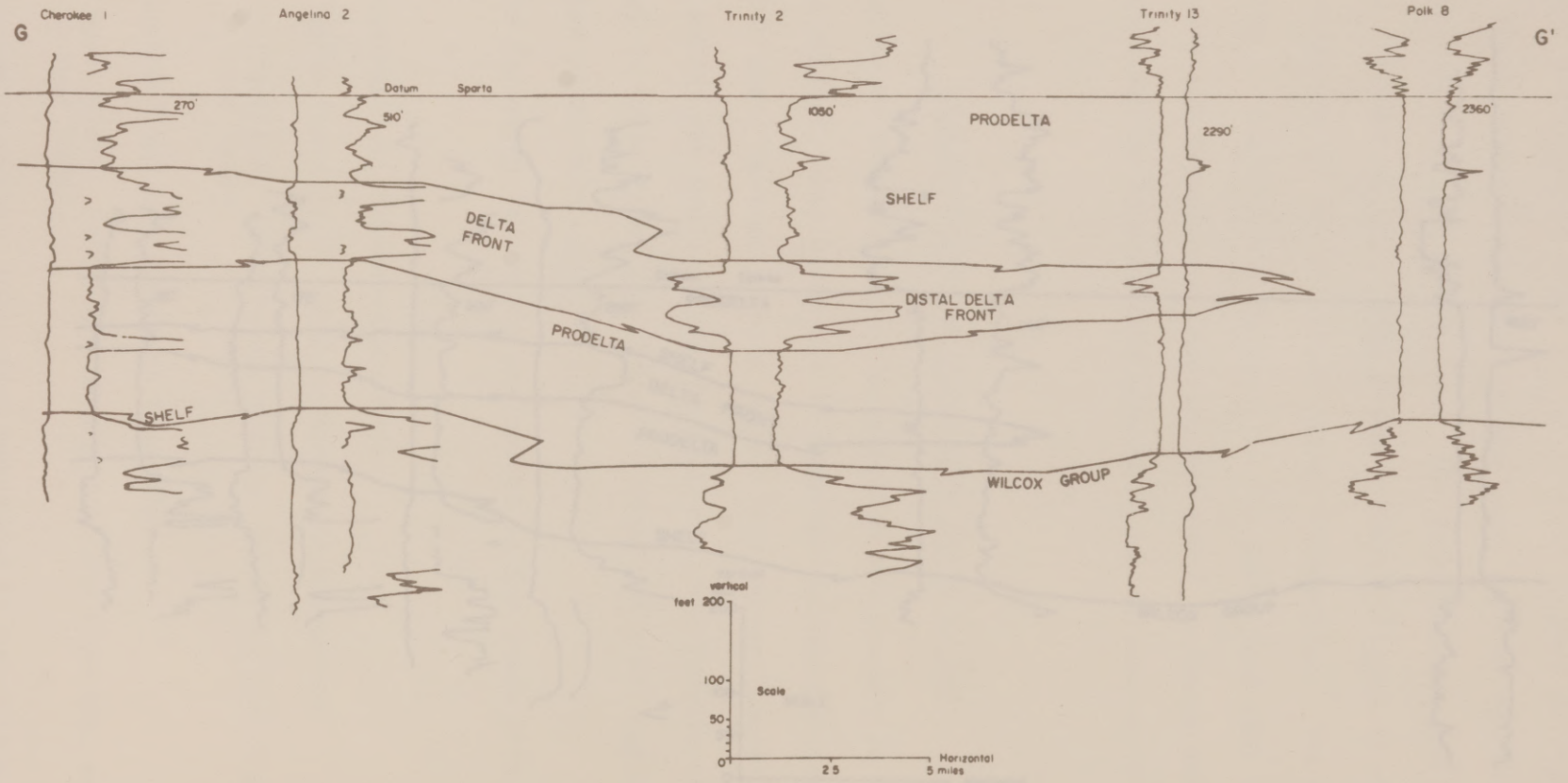

Figure 9. Stratigraphic dip section G-G'. Angelina and Trinity lobes, Queen City Delta System. Location on Figure 1.

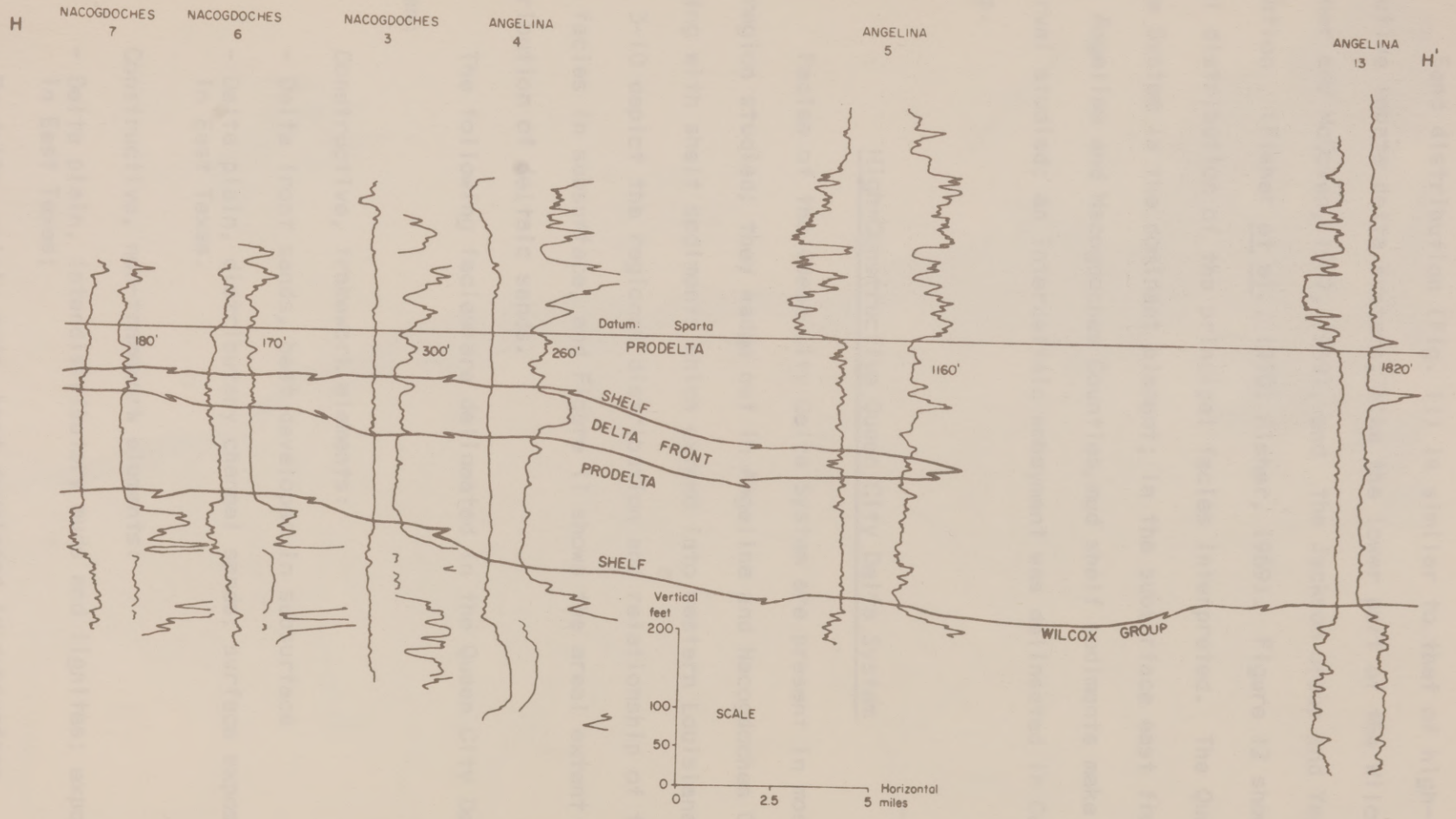

Figure 10. Stratigraphic dip section H-H'. Angelina lobe, Queen City Delta System. Location on Figure 1.

Sand distribution (Fig. 11) is similar to that of high-constructive lobate delta systems, like the lower part of the Wilcox Group (Fisher and McGowen, 1967, 1969), and the Jackson Group and Yegua Formation (Fisher et al., 1970; Fisher, 1969). Figure 12 shows the areal distribution of the principal facies interpreted. The Queen City Delta System is the dominant element; in the subsurface east from central Angelina and Nacogdoches Counties, mud shelf sediments make up the interval studied; an interdeltaic embayment was delineated in Central Texas.

High-Constructive Queen City Delta System

Facies of the Queen City Delta System are present in most of the region studied; they wedge out in Angelina and Nacogdoches Counties, merging with shelf sediments which extend into western Louisiana. Figures 3-10 depict the regional distribution and relationship of the various facies in subsurface, and Figure 11 shows the areal extent and distribution of deltaic sands.

The following facies are delineated in the Queen City Delta System:

Constructive, framework elements:

- Delta front sands, best developed in subsurface
- Delta plain, distributary channel sands; surface exposures in East Texas.

Constructive, non-framework elements:

- Delta plain, interdistributary muds and lignites; exposures in East Texas;
- Prodelta, mainly muds, best developed in subsurface.

Figure 11. Net Sand Map. Queen City Formation, subsurface, Central and East Texas.

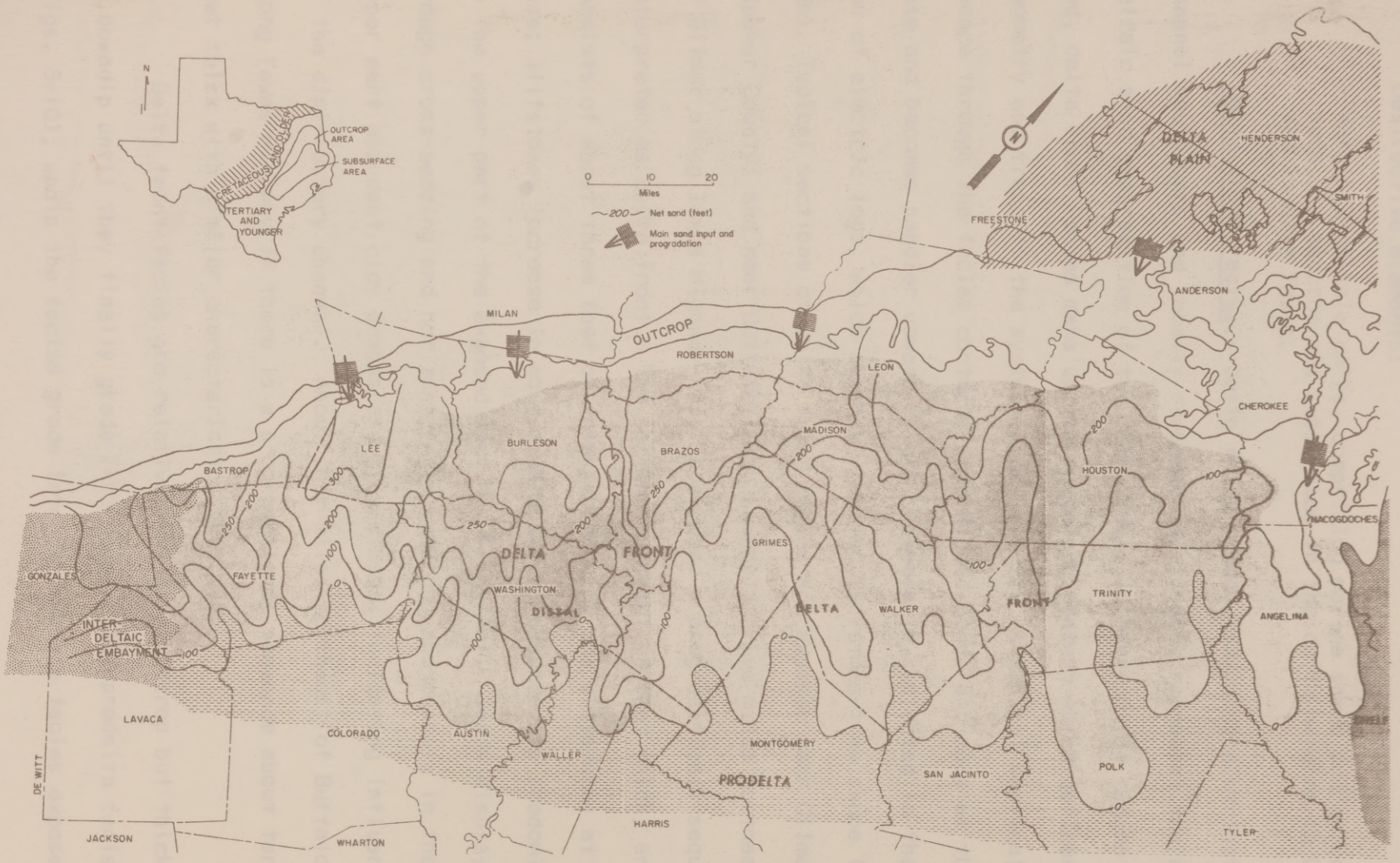

Figure 12. Areal distribution of principal facies, Queen City Delta System, Central and East Texas.

Destructive elements:

- Marginal deltaic units, comprising marine sands and carbonaceous muds, in outcrop and subsurface in the delta margins in Central and in East Texas.

Delta front facies.--Delta front sands, including distributary channel mouth-bars and locally reworked sheet sands represent the net deltaic sand progradation of the shoreline. In most of the region studied, delta front facies make up the framework element which defines the geometry and trend of the system (Figs. 11-12). A typical vertical sequence through the facies contains interbedded sands and muds at the base and becomes sandier upward. This sequence is reflected in the curves of electric logs, which show an inverted Christmas-tree shape (Fig. 13b). Typical sections of delta front facies are exposed near Gilmer (Upshur County) and near Buffalo (Leon County). Five miles northeast of Gilmer along Texas Highway 155, is exposed a progradational sequence interpreted as delta front. The section is about 18 feet thick, and consists of about three feet of interbedded clay and siltstones at the base; siltstones increase in abundance upward and sands are predominant in the upper part of the exposed section (Fig.14a). Sands display trough cross-bedding and horizontal laminations, and contain in the upper part abundant clay drapes and clay clasts, indicating influence of the distributary channel. About four miles northeast of Buffalo along Texas Highway 79 there is a progradational sequence about ten feet thick with similar characteristics (Fig.14b).

Delta front facies are relatively thin in outcrop but thicken downdip until they finally grade into muds of the prodelta facies (Figs. 5-10); updip the facies grade into delta plain facies exposed

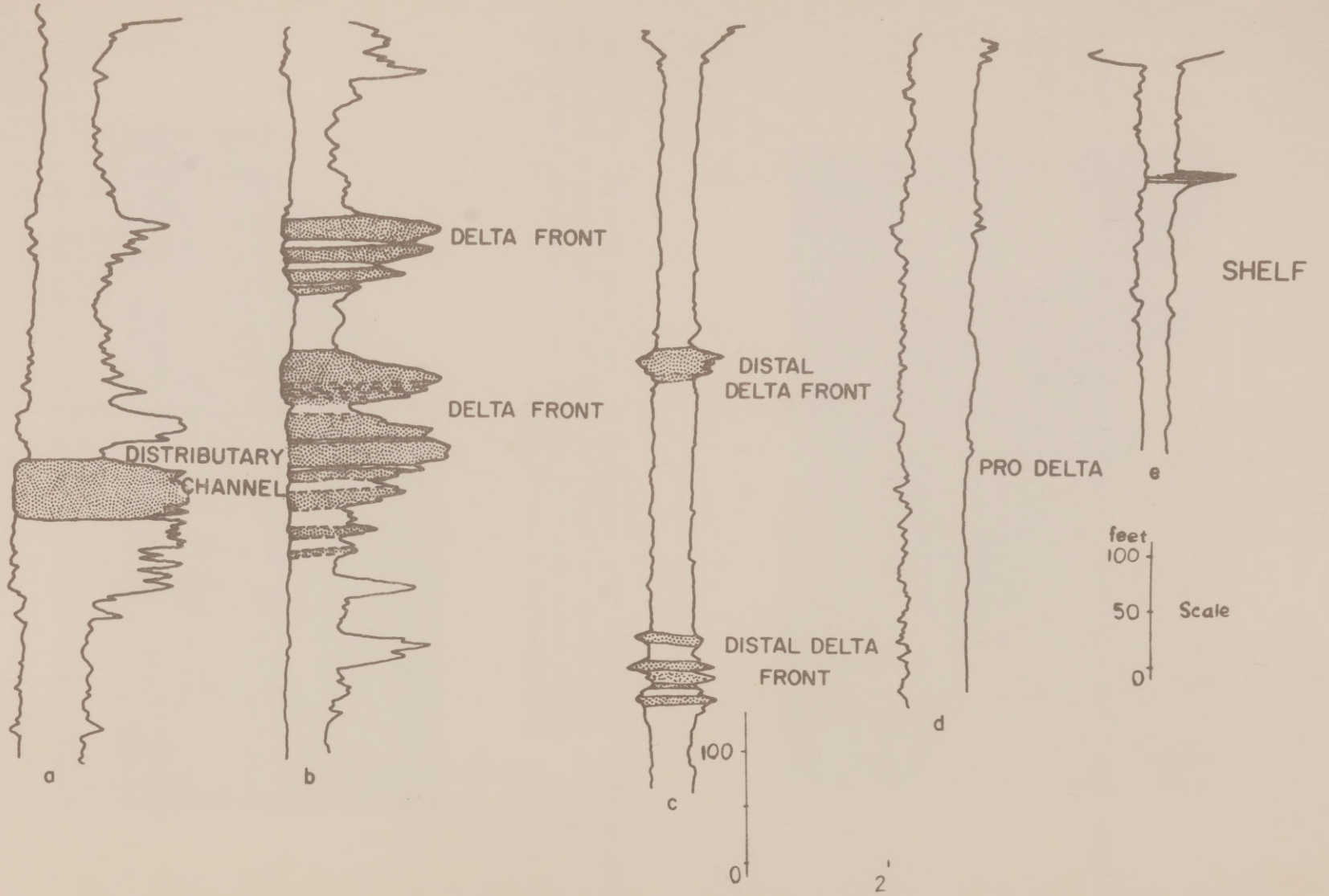

Figure 13. Characteristic shapes of electric logs of main facies in the Queen City Formation and related stratigraphic units in Central and East Texas.

Figure 14a. Progradational sequence in the Queen City Delta System five miles northeast of Gilmer along Texas Highway 155. The top of the section is made up of delta front sands which overlie prodelta and lagoonal muds. Coastal barrier sands at the base of the section.

Figure 14b. Progradational sequence in the Queen City Delta System four miles northeast of Buffalo along Texas Highway 79. Delta front sands at the top of the section, overlying organic-rich prodelta muds.

in East Texas. Electric logs show individual delta front progradational sequences generally 150 to 200 feet in thickness (Fig.13b); the thickest progradational sequences include the immediate upbar distributary channel at the top. On electric logs, distributary channel sands are distinguished by the box-like shape of the curves (Fig.13a). Delta front facies thin from Central to East Texas; maximum thickness and downdip extension are between the Colorado and Trinity Rivers, where main sediment input and progradation occurred (Figs. 11-12). Delta front facies are only about 100 feet in thickness east of the Trinity River (Figs. 4, 9, 10).

Vertical sequence, facies relationships, shape of electric log curves, and pattern of distribution shown on the net sand map are similar in character to other Tertiary delta front deposits of the Gulf Coast Basin (Fisher and McGowen, 1967, p. 112 and Fig. 1; Fisher et al., 1970, p. 241 and Figs. 1a, 3).

Delta plain facies.--The delta plain is the subaerial part of the delta; it consists of distributary rivers and interdistributary areas with lakes, marshes, and swamps. Lignites, distributary channel sands, and muddy interdistributary deposits delineate the main area of delta plain facies (Fig. 12). Interpreted delta plain deposits within the interval studied are similar to those in delta plains of modern deltas of the Mississippi type; similar facies have been described in the Wilcox and Jackson Groups and Yegua Formation of the Gulf Coast Basin.

Figure 15a. Distributary channel facies exposed along Texas Highway 79 at the intersection with the road to Ironton, between Palestine and Jacksonville. Large trough cross-bedding at base of channel, cutting down onto older deposits.

Figure 15b. Distributary channel facies half a mile south of Mount Selman along Texas Highway 69. Large trough cross-bedding and smaller scours.

Distributary channel facies.-Sands of the delta plain are restricted to distributary channels and to crevasse splays originated from them. On abandonement, distributary channels are filled with fine-grained sediments deposited from suspension. Distributary channel sands crop out along U. S. Highway 79 at the intersection with the road to Ironton, between Palestine and Jacksonville (Fig. 15a). Sands and muds in the upper part of the Queen City Formation exposed along Texas Highway 69 one and a half miles south of Mount Selman, are interpreted as distributary channel fill (Fig. 15b); sands are fine grained and clayey in the lower part and display large trough cross-bedding, locally with discontinuous lignites one half to one inch in thickness; in the upper part, smaller scale troughs, tabular cross-bedding, and laminations are present (Fig. 16a). Overlying the sands are clays and silts showing laminations and small troughs which on weathering show up as color bands (Fig. 16b); these represent muds deposited mainly by settling of suspended fines in abondoned distributary channels and interdistributary areas.

Interdistributary deposits.-Areas of the delta plain between distributary channels are occupied mainly by standing bodies of water, like marshes, swamps, and lakes, where organic-rich muds are deposited. Half a mile south of Mount Selman along Texas Highway 69, exposures of thinnly bedded carbonaceous muds and silts about ten feet thick are interpreted as interdistributary deposits associated with distributary channel sands of the delta plain (Fig. 17a). At the base of the section, about ten feet of trough cross-bedded, fine grained, clayey sands are overlain by about five feet of plastic clays interpreted as distributary

Figure 16a. Trough cross-bedding in distributary channel facies exposed half a mile south of Mount Selman along Texas Highway 69.

Figure 16b. Muddy distributary channel fills half a mile south of Mount Selman along Texas Highway 69.

channel fill. Higher in the section there are light gray siltstones, reddish brown clay and discontinuous coaly beds one half to one inch in thickness, interpreted as interdistributary deposits (Fig. 17b). Muds and glauconites of the Weches Formation overlie these delta plain facies.

Lignitic deposits, characteristic of delta plain facies, have been reported from the Queen City Formation. Fisher (1965, p. 268) in describing the occurrences of lignites in the Wilcox Group mentioned lignites in the Queen City Formation cropping out in Anderson County. Stenzel (1938) noted impure, sandy lignites in the headwaters of Spring Creek, about one mile south of Robbins (Leon County).

Prodelta facies.--Prodelta sediments are fine-grained terrigenous clastics deposited from suspension seaward of the delta front; they represent the initial stage of deltation and are mainly laminated, non-fossiliferous to sparsely fossiliferous, organic rich muds. Within a progradational sequence they stratigraphically underlie delta front facies.

A section of prodelta muds comprising about 15 feet of greenish gray, laminated clay with abundant plant remains is exposed along U.S. Highway 79 approximately four miles northeast of Buffalo (Fig. 14b). The clays become silty upward and are interbedded with thin siltstones representing the lower part of the overlying delta front facies. Prodelta facies, relatively thin in outcrop, thicken downdip and are best developed in subsurface; the facies merge both vertically and laterally with shelf sediments (Figs. 4-10). On electric logs, prodelta deposits show little SP and resistivity deflections due to lack of porous, per-

Figure 17a. Delta plain facies exposed half a mile south of Mount Selman along Texas Highway 69. Distributary channel facies at the base are overlain by coaly interdistributary muds. Glauconites and muds of the Weches Formation in the upper part of the section.

Figure 17b. Delta plain facies cropping out half a mile south of Mount Selman along Texas Highway 69. Detail of interdistributary muds and lenticular coaly beds.

meable beds (Fig. 13c,d).

Marginal deltaic facies.--Deposits developed marginal to the main area of deltation consist chiefly of strandplain-coastal barrier sediments reworked from the delta front and redistributed along strike by longshore currents. Distributary channels prograding laterally to the main site of deltation locally deposit sandier facies in the delta margins.

In subsurface in Gonzales and West Fayette Counties there are thin strandplain sands interbedded with muds (Fig. 3); this area is considered an interdeltaic embayment (Fig. 12) between two main centers of deltation, the high-constructive lobate delta system of East Texas and a high-destructive, wave-dominated delta system located in South Texas (Mr. Roberto Garcia, oral communication).

About 20 feet of massive, extensively burrowed barrier sands overlain by carbonaceous muds crop out five miles northeast of Gilmer (Upshur County) along Texas Highway 155 (Fig. 14a). Burrows of the mud shrimp Callinassa (Fig. 18a) are common in the sands. Similar facies crop out about half a mile farther northeast along the same highway, at the intersection with the road to the Gilmont Fire Lookout Tower; there, convolute bedding is observed (Fig. 18b). Sands represent coastal barriers marginal to the delta lobes; the muds are lagoonal deposits behind the barriers.

Delta lobes.--Five areas of higher sand content in the interval studied are interpreted as lobes of the Queen City Delta System (Figs. 4, 19); they represent sites of maximum sand deposition, separated from each other by less sandy, interlobe or interdeltaic facies. The lobes

Figure 18a. Sedimentary structures in marginal deltaic sands exposed five miles northeast of Gilmer along Texas Highway 155. Shore-face sands extensively bioturbated; arrow points to burrow of the mud shrimp Callinassa.

Figure 18b. Convolute bedding in shore-face sands exposed five and a half miles northeast of Gilmer along Texas Highway 155.

Figure 19. Delta lobes, Queen City Delta System, Central and East Texas.

are designated Austin-Washington, Grimes, Walker, Trinity, and Angelina; the Austin-Washington, Grimes, and Walker Lobes (Figs. 6-8), between the Colorado and Trinity Rivers, show maximum progradation of the system; the Angelina and Trinity Lobes are thinner (Figs. 9-10).

Comparison with other delta systems.--Facies composition and distribution, along with high mud content of the Queen City Delta System, are comparable to lobate deltas of the Holocene Mississippi Delta System. Thickness and geographic distribution of facies and interpreted lobes are strikingly similar to those of the Jackson Group of the Gulf Coast Basin. The system is also similar to equivalent deltaic systems in the lower part of the Wilcox Group (Fisher and McGowen, 1967, 1969) and in the Yegua Formation (Fisher, 1969). Facies characteristics of the Queen City deltas in East Texas are different from those of high-destructive deltas like the Pleistocene deposits of the Surinam coast and the modern Rhone delta system (wave-dominated), and the modern Irrawaddy and Mekong deltas (tide-dominated).

Facies tract and sand dispersal pattern.-Figure 20 shows the interpreted facies tract of the Queen City Delta System. A fluvial system, located to the northwest of the region studied, was the major agent transporting sediments to this part of the Gulf Coast Basin; deposits recording its presence have been largely removed by erosion and are not preserved in the region studied. Downdip from the fluvial system is a delta complex, referred to as the high-constructive, lobate Queen City Delta System.

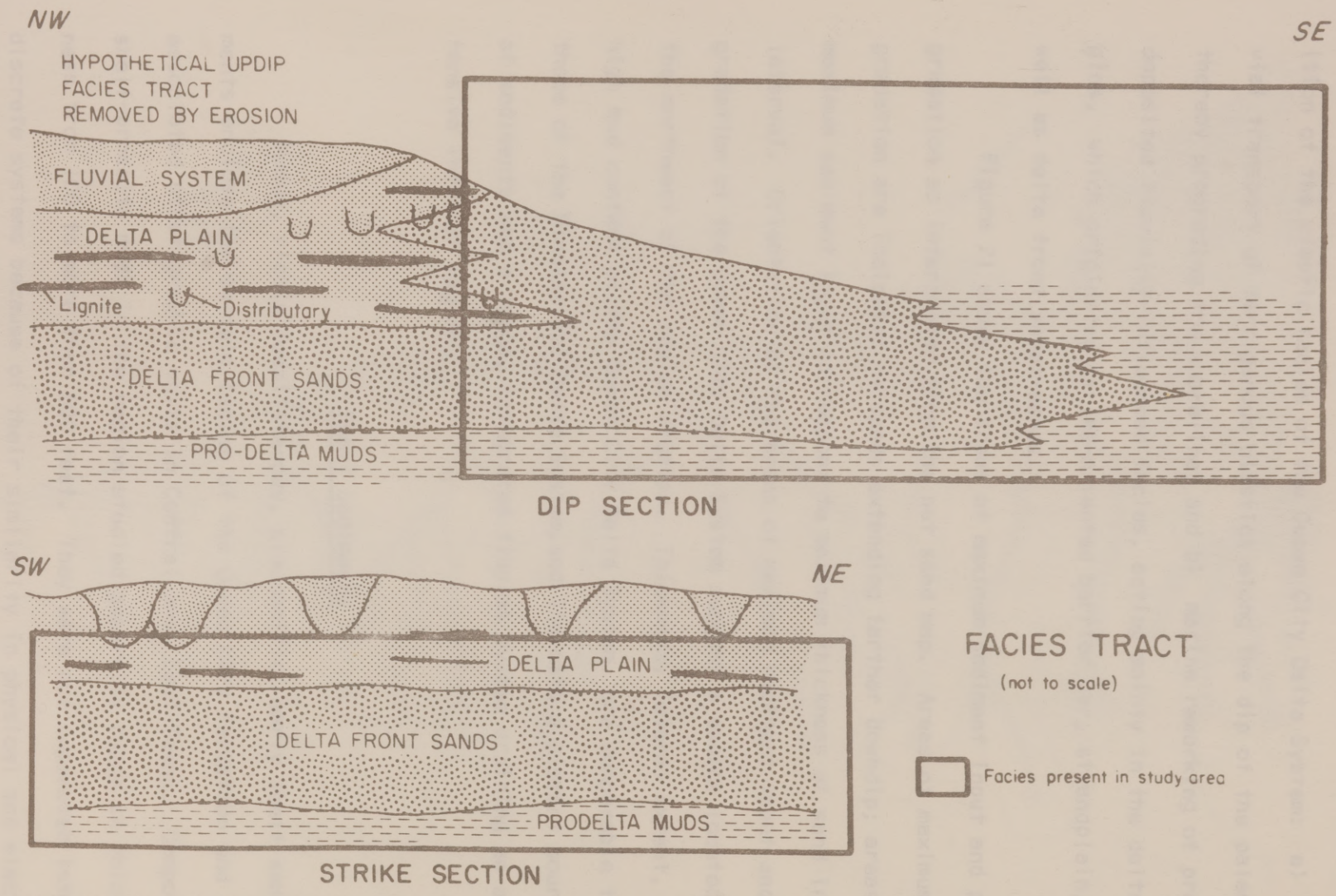

Figure 20. Interpreted facies tract of the Queen City Delta System. A hypothetical updip fluvial system located to the northwest of the region studied was the main agent transporting sediments to the basin. A deltaic complex developed downdip is partly preserved and referred to as the Queen City Delta System.

Two main processes of sediment dispersal acted during deposition of the clastic facies of the Queen City Delta System: a) fluvial transport of terrigenous clastics along the dip of the paleoslope, thereby prograding the shoreline; and b) marine reworking of previously deposited fluvially-influenced facies, acting mainly in the delta margins, which originated strike-oriented barrier bar, strandplain, as well as delta front sheet-sands.

Figure 21 shows the areas of maximum sediment input and progradation as interpreted from the net sand map. Areas of maximum progradation are indicated by sands extending farther downdip; areas of maximum sediment input correspond to maximum thickness of sand in the interval. Orientation of the areas of maximum sediment input and progradation of the Queen City Delta System suggest a source located to the northwest of the region studied. Thickness, lateral extent, and high mud content of the Queen City Delta System are comparable to those of the Mississippi Delta System, and indicate a distant source of sediments and a large, integrated fluvial system draining an extensive interior region.

Shelf Sediments

Muddy, richly fossiliferous, glauconitic, marly shelf sediments enclose the deltaic facies of the Queen City Formation and associated stratigraphic units in Central and East Texas. Composite shelf-prodelta muds in the region studied generally range in thickness from 100 to more than 600 feet. They were not separated into discrete systems because of their similarity in physical and electric-

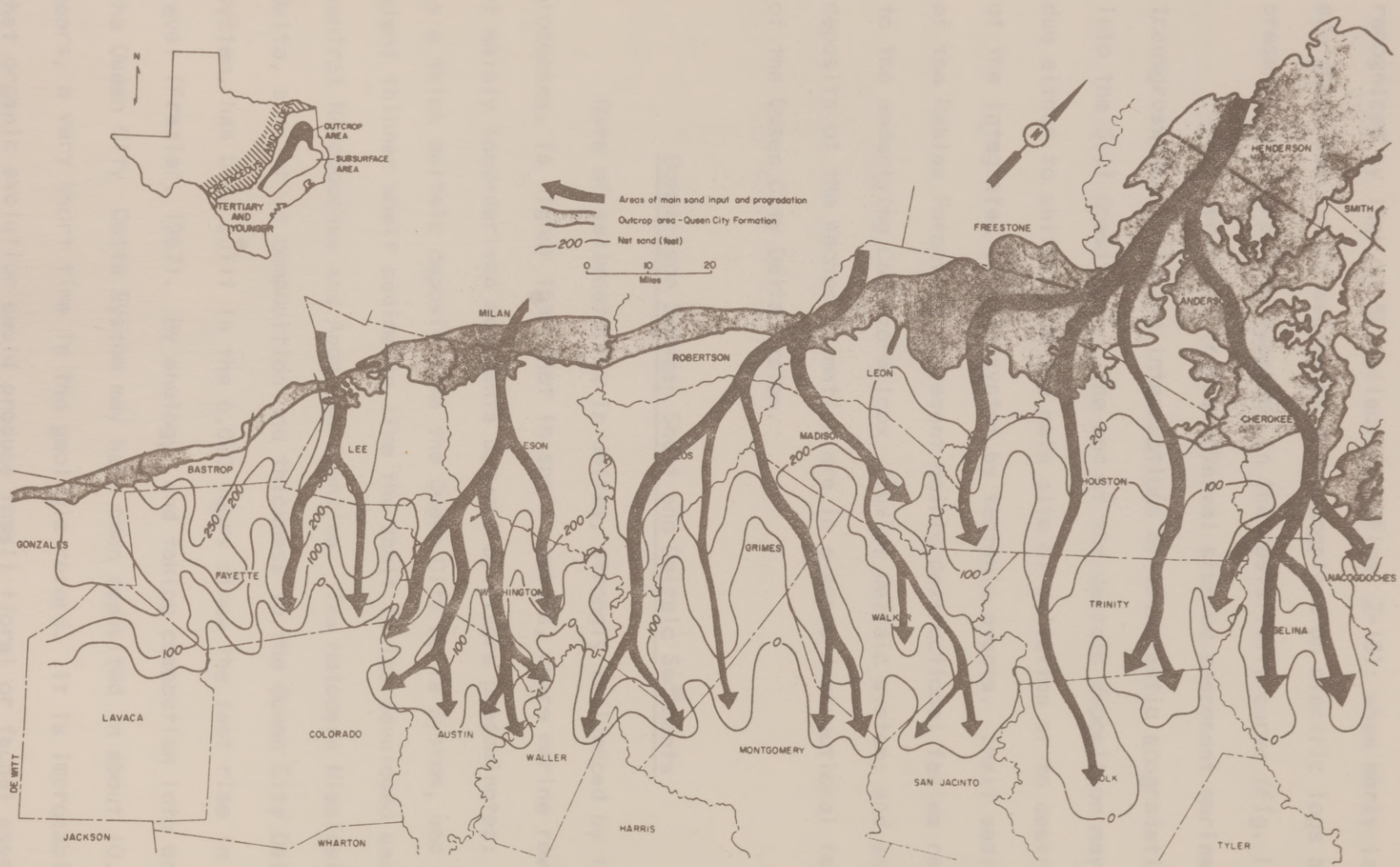

Figure 21. Sand dispersal pattern, Queen City Delta System. Source areas located far to the northwest of the region studied provided sediments transported along the dip of the paleoslope. Marine reworking of previously deposited sediments acted mainly in the delta margins.

log characteristics. On electric logs, prodelta-shelf sediments are recognized by lack of SP deflections (Figs. 2-10); when marly layers are developed, shelf sediments are recognized on electric logs by the presence of sharp high readings in the resistivity curve (Fig. 13d).

Shelf sediments in the interval studied represent marine transgressions following interruptions of the clastic progradation into the Gulf Coast Basin; the end of the deltaic deposition may be due either to shifting of the main site of deltation or to destruction of the integrated fluvial system by tectonic events. Shelf sediments of the Reklaw Formation represent mainly destructional facies related to the underlying Carrizo-Wilcox fluvial deltaic system; and shelf deposits of the Weches Formation are in a sense destructional facies of the Queen City Delta System.

Comparison Between Shelf and Deltaic Sediments

Rate of sedimentation in deltas, strongly influenced by fluvial processes, is higher than that in shelf systems, where marine reworking of mainly land-derived sediments brought by rivers predominates; the result is a thick deltaic deposit like the Queen City Delta System, and equivalent thinner shelf sediments like the shelf facies developed east of central Nacogdoches and Angelina Counties. The Holocene Mississippi Delta, similar in composition and thickness to the Queen City Delta System, has been built in the 6,000 years since the last rise in sea level (Frazier, 1967). By analogy, and taking compaction into account, the Queen City Delta System may have been deposited in about 10,000 years, a very short time in the geologic record. It is improbable that organic evolution could produce fossil floral or faunal assem-

blages that would permit paleontological correlations within quickly deposited, terrigenous clastic sequences like the Queen City Delta System.

Shelf deposits generally are of regional extent and are lithologic markers, like the shelf facies bounding the Queen City Delta System. Shelf environments are inhabited by organisms which produce intense bioturbation in the beds, destroying primary sedimentary structures, resulting in massive bedding; because shelf sediments are richly fossiliferous, they are ideal for paleontological and paleoecological studies (e.g. Shafik, 1969). Deltaic facies generally are local and interfinger with each other; they are non-fossiliferous to sparsely fossiliferous, and bioturbation and fossil remains are found mainly in areas subjected to marine influence.

FORMAL NOMENCLATURE AND DEPOSITIONAL SYSTEMS

Regionally persistent glauconitic marls and sands of the Reklaw Formation overlie thick massive sands of the Carrizo Formation. These glauconitic sediments are in turn overlain by sands and muds of the Queen City Formation, which is overlain by glauconites, marls, and fossiliferous shales of the Weches Formation. The Sparta Formation, consisting of sands and muds, overlies the Weches Formation (Fig.2)

The term Queen City was introduced by Kennedy (1892). Early study of the Queen City Formation was conducted by Wendlandt and Knebel (1929) as a part of their studies of the Claiborne Group in East Texas. Stenzel (1938) mapped and described the formation in Leon County. In Cherokee County, Stenzel (1953) subdivided the Queen City Formation into a lower member consisting of sands and carbonaceous shales (Arp Member), a middle, dominantly glauconitic part (Omen Glauconitic Member), and an upper member made up of sands and carbonaceous shales which he did not name. Dzilsky (1953), described the Queen City Formation in Nacogdoches County. Callender (1958) made a petrologic study of the formation in Bastrop County. Smith(1958) recognized in northwestern Louisiana the subdivisions of the Queen City Formation proposed by Stenzel (1953), and designated the upper unnamed part of the formation as the Myrtis Member.

Predominantly muddy deposits bound the Queen City Formation; those underlying it make up the Reklaw Formation, a stratigraphic unit about 100 feet thick present in surface and subsurface in Central and

East Texas. Stenzel (1938) divided the Reklaw Formation into a lower Newby Glauconitic Sand Member and an upper Marquez Shale Member. The predominantly shaly deposits above the Queen City Formation are formally designated Weches Formation; it ranges in thickness from 30 to 300 feet. Stenzel (1938) divided this formation into the marly and sandy Tyus Member at the base, the fossiliferous and glauconitic Viesca Member in the middle, and the Therrill Member of silts and carbonaceous clays at the top.

Existing formal nomenclature does not coincide with the genetic units present in the interval studied (Figs. 2, 22). The Reklaw Formation comprises shelf deposits in the lower part and prodelta in the upper portion. The Queen City Formation is deltaic; delta plain, marginal deltaic, prodelta, and delta front facies are exposed in Central and East Texas; prodelta and delta front facies are best developed in subsurface. The Weches Formation is made up of shelf sediments in the lower part and prodelta facies in the upper part. Standard faunal zones in the Gulf Coast Basin have been defined in fossiliferous shelf facies of the Reklaw and Weches Formations. The Sparta Formation represents a deltaic sequence younger than that of the Queen City Formation. To the east, in the area of wedging out of the Queen City deltaic facies, shelf sediments make up the interval between the Carrizo and Sparta Formations, and extend to western Louisiana where they form part of the Cane River Formation.

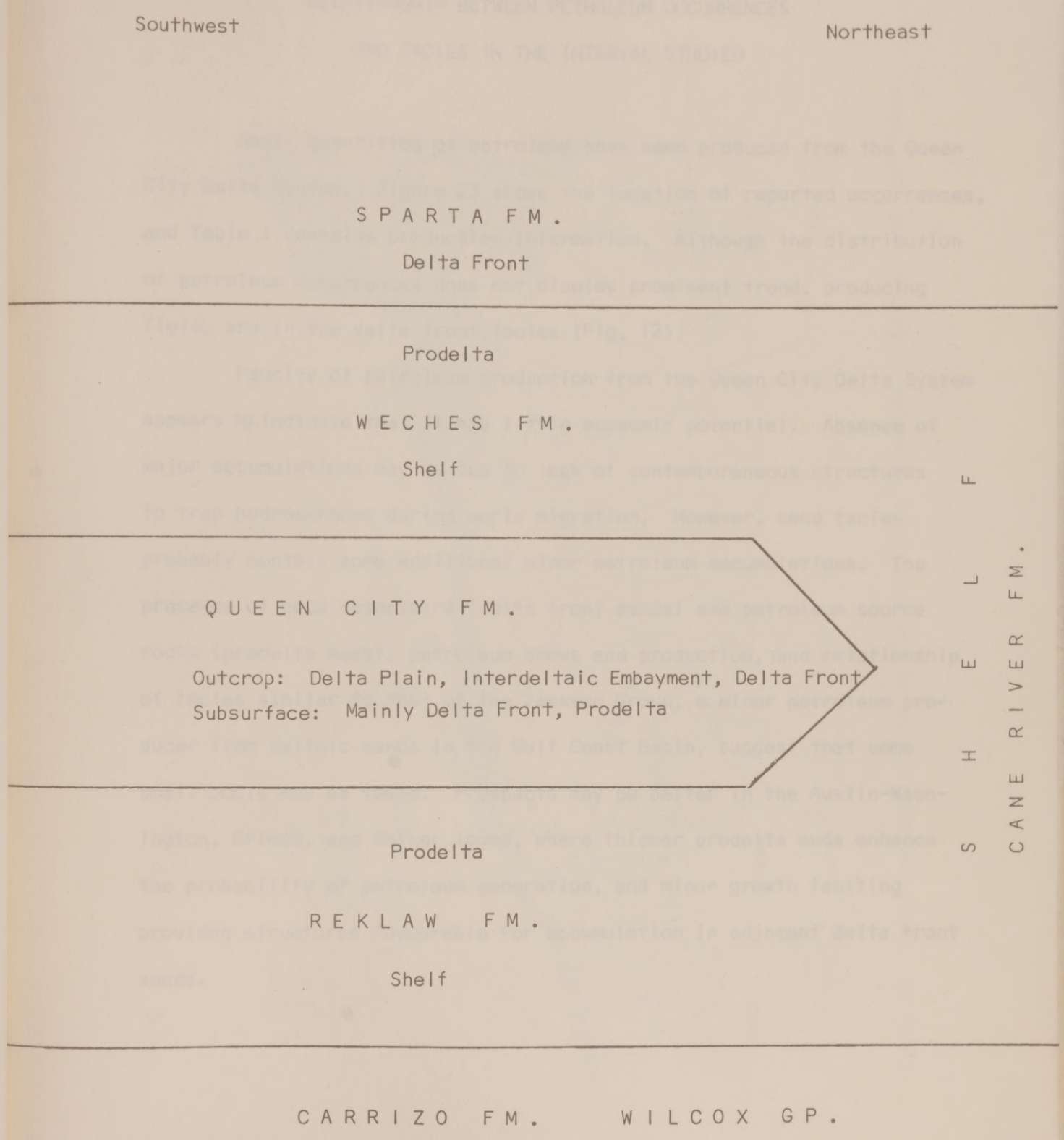

Figure 22. Relationship between genetic units and formal nomenclature in the interval studied, Central and East Texas.

RELATIONSHIP BETWEEN PETROLEUM OCCURRENCES AND FACIES IN THE INTERVAL STUDIED

Small quantities of petroleum have been produced from the Queen City Delta System. Figure 23 shows the location of reported occurrences, and Table I contains production information. Although the distribution of petroleum occurrences does not display prominent trend, producing fields are in the delta front facies (Fig. 12).

Paucity of petroleum production from the Queen City Delta System appears to indicate that it has little economic potential. Absence of major accumulations may be due to lack of contemporaneous structures to trap hydrocarbons during early migration. However, sand facies probably contain some additional minor petroleum accumulations. The presence of good reservoirs (delta front sands) and petroleum source rocks (prodelta muds), petroleum shows and production, and relationship of facies similar to that of the Jackson Group, a minor petroleum producer from deltaic sands in the Gulf Coast Basin, suggest that some small pools may be found. Prospects may be better in the Austin-Washington, Grimes, and Walker lobes, where thicker prodelta muds enhance the probability of petroleum generation, and minor growth faulting provides structures favourable for accumulation in adjacent delta front sands.

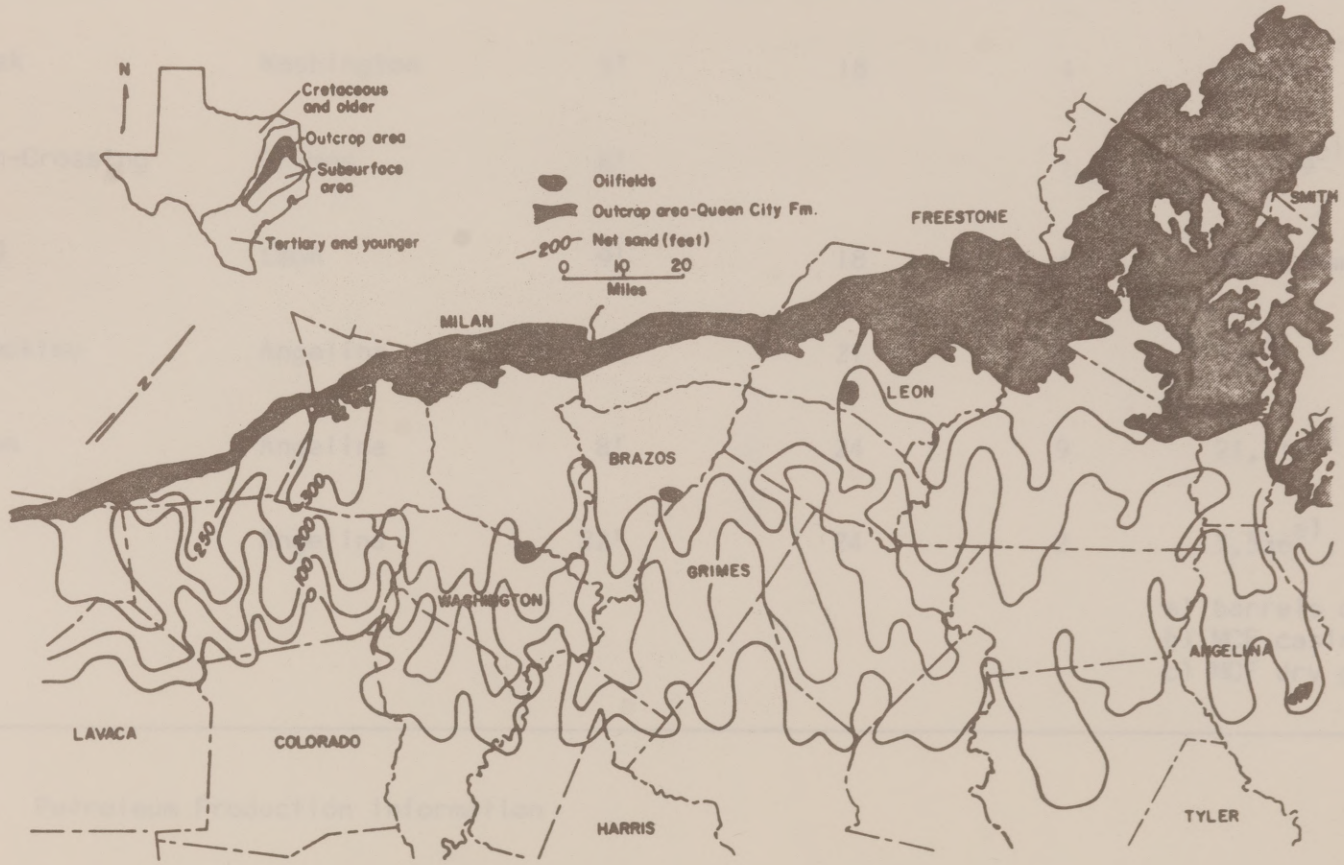

Figure 23. Petroleum occurrences in the Queen City Formation in Central and East Texas.

Field	County	Av. Thick. Prod. Int.	Av. API Gravity	Wells Prod.	Cum. Prod. 1-1-1970
Clay Creek	Washington	9'	18	1	No data
Fergusson-Crossing	Grimes	6'		1	15,789[c]
Keith-300	Leon	9'	18	1	Non-Commercial
Calmar Hockley	Angelina	3'	21	1	305[a]
Huntington	Angelina	8'	24	9	21,311[a]
Roane	Angelina	22'	24	2	3,536[a]; 10[b]

a) barrels of oil
b) MCF casinghead gas
c) MCF dry gas

Table 1. Petroleum Production Information

Source: International Oil Scouts Association (1971)

APPENDICES

Terminology

Nomenclature used is informal and based on genetic units; genetic facies assemblages or depositional systems do not necessarily coincide with formal stratigraphic units of the Gulf Coast Basin (Fig. 2, 22). Fisher and McGowen (1967) used the term depositional systems to include informal rock-stratigraphic units made up of genetically related facies. According to Scott and Fisher (1969), depositional systems are "assemblages of process-related sedimentary facies." Such assemblages as deltaic, fluvial, and shelf are examples of depositional systems.

According to Fisher (1969), deltas are river-fed depositional systems that result in irregular progradation of shorelines, and a delta system is a complex of delta lobes. Fisher (1968) classified deltas genetically into high-constructive (elongate and lobate) and high-destructive (tide- and wave-dominated), based primarily on the relative proportions of fluvial and fluvially influenced facies to marine facies. Constructional facies are those resulting from progradation and agradation during periods of active outbuilding; sands are framework facies, while non-framework facies comprise muddy deposits. Destructional or transgressive units result from marine processes related to abandonement of the site of deltation. Fluvial and fluvially influenced processes are important in high-constructive deltas; marine distribution and reworking of sediments predominate in high-destructive deltas as well as in strike systems such as strandplains and barrier bars (Fig. 24).

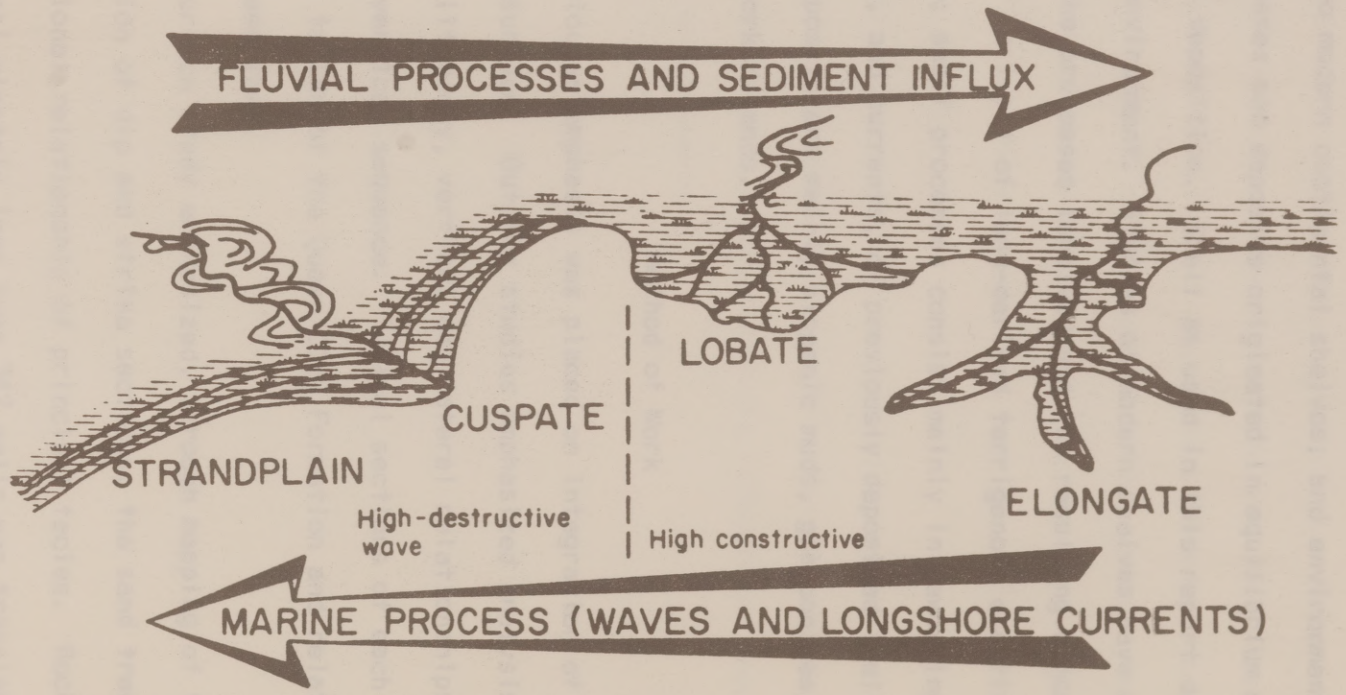

Figure 24. Relationship of marine processes and fluvial influence on wave dominated deltaic coastlines. (After Scott and Fisher, 1969).

The term shelf has three main usages in the literature: structural, denoting a cratonic, stable feature of basins; physiographic, as applied to modern continental shelves; and environmental, referring to the processes and deposits originated in equilibrium with the environment of deposition. Shelf as used in this report denotes a depositional environment. Studies of modern shelves have provided an insight to the processes involved and the resulting deposits. There is little or no input of land-derived terrigenous clastics into shelf environments; shelf processes consist mainly in reworking, by marine tides, waves, and currents, of previously deposited (relict) sediments; resulting deposits are mainly biogenic muds, glauconites, carbonates, and some reworked sands.

Method of Work

Particular emphasis was placed on integration of data from outcrop and subsurface. Outcrop studies emphasized analysis of sedimentary structures, lithology, vertical and lateral relationships of specific facies, and vertical sequence. Typical sections of each of the major depositional facies of the Queen City Formation and related stratigraphic units were described.

Subsurface study emphasized, through mapping of framework facies and preparation of dip and strike sections, the sand trends and the three-dimensional relationship of principal facies. Rock identification on conventional electric logs fron 342 wells was translated into colored lithologs at scale of one inch equals 100 feet; lithologs were utilized in the construction of 24 dip sections spaced at 10 mile intervals and three strike-sections at 15 mile intervals, which provided the basis

for the regional correlation and for the three-dimensional reconstruction of lithologic facies. The strike sections and 15 of the dip sections were redrawn using electric-log tracings. Amount of net sand in the interval studied was determined for each well from the electric logs; these values were used in the construction of the net sand map, which defines the areas of maximum sand input and progradation. Depositional facies, individual delta lobes, and sand dispersal pattern were defined from outcrop information, net sand distribution, and stratigraphic sections.

Genetic interpretations were based on comparison of features, trends, and composition of the Queen City Formation and related stratigraphic units with published,previously interpreted depositional systems, modern and ancient.

Well Information

WELL *	COMPANY	NAME	NET SAND (feet)	Q-NUMBER **
Anderson County:				
1	L. A. Douglas	McElroy-1	240+	42
2	Sam B. King	Lassiter-1	180+	35
3	F. R. Jackson	Holcomb-2	190+	37
4	Placid Oil Co. et al.	Polk-4	140+	45
5	Deltex Oil Co.	Day Est.-1	170+	50
6	E. Jackson, Jr.	Springman et al.-A-1	180+	91
7	T. D. Humphrey, Jr.	Starkey-1	150+	446
Angelina County:				
1	Sam Trant et al.	McKnight-1	85	53
2	D. H. Byrd	Angelina County Lbr.-1	90	57
3	Coastal Refg. Co.	Henderson-1	50	54
4	American Liberty Oil Co., Weeb & Knapp	Cameron Heirs-1-B	72	55
5	J. R. Meeker et al.	Massingill-1	0	59
6	J. W. Frazier	Angelina Lbr.-1	0	2
7	B. G. Byars & E.L. Kurth	Southern Pine Lbr. Co.-1	0	49
8	B.G. Byars & E.L. Kurth	Angelina County Lbr.-2	0	50
9	E. L. Kurth	Koppers Co.-1	25	67

* Location on Fig. 1
** Nomenclature of the Texas Water Development Board, Austin.

WELL	COMPANY	NAME	NET SAND (feet)	Q-NUMBER
10	Trans-American Petr. Corp.	Hambrick-1	25	65
11	K. McHenry et al.	Southern Pine Lbr.-1	15	4
12	MacDonald Oil Corp.	Stewart-1	12	60
13	C. Andrade III	Nerrin-1	0	52
14	K. L. McHenry	Long Bell-1	0	39
15	Tex-Mo Drlg. Co.	Long Bell Petr. Co. -1	0	51
16	Arkansas Fuel Oil Co.	The Carter Co.-1	0	3
17	K. L. McHenry	Cameron Co.-1	0	5
18	Petr. Heat & Power Co.	Lbr. Co.-1	8	7
19	The Mudge Oil Co.	Fairchild et al.-1	6	12
20	Union Producing Co.	Fenley-1	75	38
21	Humble Oil & Refg. Co.	Angelina County Lbr. Co. et al.-1	70	58
Austin County:				
1	Drillard and Waltermire	Batla-1	28	94
2	The Texas Co.	Kollatschny-1	0	88
3	Skelly Oil Co.	Zander-1	25	82
4	Scurlock Oil Co.	Kulow-Bielefeld Unit-1	0	29
5	The Texas Co.	Hackfield-1	80	103
6	Holmes Drlg. Co. & Robert Mosbacher	Wright-1	85	115
7	Humble Oil & Refg. Co.	Bader-1	60	126
8	Phillips Petr. Co.	Schulz-1	80	24
9	John G. Mayo	Bollman-1	75	60

WELL	COMPANY	NAME	NET SAND (feet)	Q-NUMBER
10	Humble Oil & Refg. Co.	Sherrod-Y-16	0	23
11	H. Williams et al.	Mewis-1	40	17
12	Sun Oil Co.	Mikeska-1	40	3
13	Humble Oil & Refg. Co.	C. S. Hillboldt-1	0	2
14	Butcher-Arthur Inc.	Schneider-1	15	93
15	Wright Drlg Co.	Kubicek-1	0	85
16	Magnolia Petr. Co.	Zapalac-1	0	81
17	Humble Oil & Refg. Co.	Hedwig Miller-1	68	72
18	Sinclair Oil & Gas Co.	Ballard Unit No. 3-1	35	66
19	Pure Oil Co.	Stepan-1	50	71
Bastrop County :				
1	Humble Oil & Refg. Co.	Hillsman-1	230	10
2	Continental Oil Co.	Mallina-1	225	2
3.	The Texas Co.	Cone Hole-A-15	200	22
4	Thos. Jordan, Inc.	Grubert-1	250	82
5	Sunray Mid-Continent & Skelly	Holme-1	250	100
Brazos County:				
1	Humble Oil & Refg. Co.	Trant-1	160	15
2	Petr. Heat & Power Co.	Cahill-1	220	13
3	Phillips Petr. Co.	Weems-1	130	21
4	Lonnie Holotik Co.	Prescott-1	170	19
5	Southwood Oil Co.	Peters-1	250	1

WELL	COMPANY	NAME	NET SAND (feet)	Q-NUMBER
6	J. Eller Thomas	Milo Heirs-1	175	29
7	N. W. Hunter	Jericho-1	170	20
8	Mudor Oil Co.	Kopph-1	280	27
9	Fred W. Shield	Louis Orlando Est.-2	160	33
10	Katy Drlg. Co.	A & M College-6	230	6
Burleson County:				
1	Haven Oil Co.	Lewis Est.-1	230	7
2	Jordan Drlg. Co.	Hitchcock-1	250	4
3	Peerless Oil & Gas	Englė-2	180	6
4	Chas. Fraser, Inc.	Marek-1	270	9
5	Newman Brothers Drlg. Co.	Newman-1	250	10
6	H. Y. Barnett	Fick-1	270	11
7	J. H. Liles	Scott-1	170+	13
8	Bear Pond Oil Co.	Coulter-1	200	16
Cherokee County:				
1	Jackson Oil Co. & Bill R. Tipton	Panline-1	90	56
2	Carter Jones Drlg. Co.	White et al.-1	125	57
3	Union Prod. Co.	Sessions-1	80	36
Colorado County:				
1	Sinclair Prairie Oil Co.	Gordon-1	15	231
2	H. B. Lively	Brune-1	0	76

WELL	COMPANY	NAME	NET SAND (feet)	Q-NUMBER
3	C. Howard Phifer	Wooten-3	0	144
4	Sinclair Prairie Oil Co.	Thompson-1	0	222
5	Tide Water Ass. Oil Co. et al.	Brandon-1	0	190
6	Brazos Oil & Gas Co.	Struss-1	0	6
7	Chicago Corp. & Skelly Oil Co.	Dennis-1	0	203
8	Shell Oil Co.	Kane-1	0	42
9	W. R. Davis	Brownson-3-A	0	158
10	Warren Petr. Corp.	Miller-1	0	191
11	Union Oil and Gas Corp. of Louisiana	Luckett Unit-1	0	70
12	Midstates Oil Corp	Suchadoll Unit-1	0	220
13	Sinclair Prairie Oil Co.	Koliman-1	10	281
14	Oatman Oil Inc.	Strunk & Robel-1	0	133
15	Lone Star Prod. Co.	Plow Realty-4	0	120
16	Skelly Oil Co.	Miller-1	0	249
17	Srurlock Oil Corp.	Duncan-Wintermann Unit-1	0	267
18	M. T. Halbouty	Hoelscher-1	0	44
19	British American Oil Prod. Co.	Roensch-1	0	162
20	Sinclair Prairie Oil Co.	Fehrenkamp-1	0	248
21	Sinclair Prairie Oil Co.	Glasscock-2	0	232
22	Union Prod. Co.	Thomas-A-1	0	286
Fayette County:				
1	Shell Oil Co.	Marburger-1	300	106

WELL	COMPANY	NAME	NET SAND (feet)	Q-NUMBER
2	H. F. Brown, Jr., Sunray D-X Oil Co., and Stapp Drlg. Co.	Wehmeyer et al.-1	150	102
3	Parker McFarland & Monsanto Chem. Co.	Styrk-1	180	98
4	Gulf Shore Oil Co.	Kremel-1	175	92
5	M. E. Davis	Janda-1	125	86
6	Gulf Coast Lease Holds Inc. & J. D. Watzlavick	Vogelsang-1	125	44
7	O. C. Gorvey	Meyen et al.-1	115	42
8	M. M. Miller	Cole et al.-1	182	35
9	Fidelity Oil Royalty Co.	Wegenhoft-1	115	31
10	C. Andrade III & J. R. Less	Eichler-1	160	29
11	Seabord Oil Co. & Standard Oil Co. of Kansas	Pietsch-1	200	23
12	W. J. Rasnick	Krannosky-1	285	20
13	T. Wilson	Leview-1	200	18
14	Hamman Oil & Refg. Co. & J. Crawford	Harris-1	250	8
15	Sutton Drlg. Co. & E. H. Phillips	Cokrell-1	180	107
16	Traders Oil Co.	Fleck-1	125	13
17	American Liberty Oil.Co.	Baca-1	160	33
18	American Liberty Oil Co.	Schlottman-1	150	28
19	Continental Oil Co.	Louise Paulus-1	180	82
20	Continental Oil Co.	Cockrill-1	200	70
21	Coastal Refg. Inc., & C. D. Miller	Faison-1	225	85

WELL	COMPANY	NAME	NET SAND (feet)	Q-NUMBER
22	Cockburn Oil Corp.	Gebhard-1	170	67
23	J. W. Frazier	Zock-1	225	17
24	Kennescott Copper Corp.	Schwartz-1	135	90
25	J. S. Michael Co.	Kerr Johnson et al.-1	180	122
Gonzales County:				
1	Rodney Delange	Burkhalter-1	175	86
2	J. W. Gorman	Parr-2	225	4
3	Texon Rox Co. & Auto Ordenance Corp.	Kelley-1	190	43
4	The Chicago Corp.	Bokhm-1	250	28
5	O. Neathery, Jr.	Balbridge-1	150	10
6	Carter Foundation Prod. Co.	Brubaker-1	220	57
7	Kirkwood & Co.	Wright-1	200	128
8	W. V. Hardin	Robinson-1	200	167
Grimes County:				
1	J. M. West	Garret-2	150	3
2	James A. Smith	Isbell-1	180	4
3	J. H. Woodard, Jr.	Upchurch-1	200	6
4	Woodley Petr. Co. & Signal Oil & Gas Co.	Wilson-1	90	5
5	E. G.Gaforth et al.	Gaforth Fee-1	20	19
6	Placid Oil Co.	Harris-1	40	27
7	K. N. Ranger & R. L. Kirkwood	Bradley	120	8

WELL	COMPANY	NAME	NET SAND (feet)	Q-NUMBER
8	Shell Oil Co.	Johnson-2	220	17
9	Hunt Oil Co.	Yeager-1	220	28
10	The Texas Co.	Moody-1	110	30
11	Humble Oil & Refg. Co.	Sealy-1	135	36
12	Moore & Ahern	Bennett-1	100	37
13	Houston Drlg. Co., R.A. Irwing et al., South Texas Dev.	Schoenfeldt-1	50	42
Houston County:				
1	Sam B. King	Caskey-1	180+	55
2	Investors Syndicate of the Southwest, Inc.	Guenther-1	195+	75
3	J. R. Phillips, Jr.	Marsh-1	180	58
4	M. L. Hunt	Houston County Lbr. Co.-1	70	60
5	Marine Gathering Co.	Merriwether-1	88	64
6	Frankel & English	Houston County Timber Co. -1	90	65
7	Humble Oil & Refg. Co.	Curry-1	55	20
8	Cherry and Kidd	Moore-1	200	61
9	R. M. Sims	Walker & Harris-1	190	107
10	Continental Oil Co.	Wooters-1	124	31
11	Reynolds Mng. Corp.	Knox-1	100	1
12	Ivy and Moran	Murray & Sons-1	200	27
13	Woodley Petr. Co.	Bruton Est.-1	170	11
14	F. T. Lytle	Watson Heirs-1	130	92

WELL	COMPANY	NAME	NET SAND (feet)	Q-NUMBER
15	L. A. Douglas	C. McGrady-1	120+	7
16	Coastal Refineries, Inc.	Southern Pine Lbr. Co.-1	90	52
17	M. W. Shriver	Wayman & Bromberg-1	100	66
18	Magnolia Petr. Co.	A. B. Spence-1	160	70
19	Chism & Porter	Austin-1	170	144
20	British American Oil Prod. Co.	C. A. Westerman-1	60	205
21	George Blaylock Co.	Southland Paper Mills-1	100	233
22	E. A. Carter and B. A. Kaemmerer	Timber Co.-1	160	238
23	Texas Gen. Prod. Co.	Bromberg-English-1	150	256
24	Humble Oil & Refg. Co.	Stevens-1	135	264
Jasper County:				
1	Humble Oil & Refg. Co.	N. Mills et al.-1	0	22
2	Atlantic Rich. Co.	Henderson et al.-1	0	94
Lavaca County:				
1	Herton Oil Co.	Hohman-1	150	93
2	Seabord Oil Co.	Emma Sebastian-1	125	149
3	Geochemical Surv.	Jim Patek-1	10	164
4	Sohio Petr. Co.	Ponish-1	25	71
5	Stanolind Oil & Gas Co.	Roeber et al. Gas Unit-1	0	148
6	Adams & Haggarty	Sobotik-1	0	145
7	Texas Eastern	Orsak-1	0	165

WELL	COMPANY	NAME	NET SAND (feet)	Q-NUMBER
8	Pure Oil Co.	Fred Schultz-1	0	121
9	Pure Oil Co.	Reese Unit-1	0	95
10	George Strake	Wolfsdorff-1	0	62
11	Tide-Water Assoc. Oil Co.	Baum-1	0	56
12	Horrigan & Fohs	Martisak-1	0	137
13	Gulf Oil Corp.	Goodrich-1	0	47
14	Hassie Hunt Trust Est.	Lampley-1	0	99
15	Sterling Oil & Refg. Co.	Hoffman-1	0	101
16	Sun Oil Co.	Borches-1	0	79
17	H. J. Chavanne - Trustee	Carter-1	0	168
18	Roeser & Pendleton, Inc.	Ponish-1	15	94
19	Lone Star Prod. Co.	McManus-2	0	174
20	North Central Oil Corp.	Robertson-2	0	192
21	Great Lakes Carbon Corp.	Oldham-1	0	138
22	Jack Love & Sun Oil Co.	Stewart-1	0	153
23	McCarrick Trustee	Allen-1	0	158

Lee County:

1	Standard Oil Co. of Texas & Seabord of Delaware	Biggers-1	225+	10
2	Cowan & Sorey, Inc. Roney Inc.	St. Peoples	210+	11
3	Union Prod. Co.	Preuss-1	310	1
4	Seabord Oil Co.	Klissman-1	330	21
5	Seabord Oil Co.	Braman-1	230	7

WELL	COMPANY	NAME	NET SAND (feet)	Q-NUMBER
6	Nails Creek Oil Co.	Seymour Sacks-1	250	29
7	W. H. Bode	Hill-1	280	44
8	A. A. Spidle	Ben Pietsch	275	59
Leon County:				
1	D. H. Byrd	Leathers-1	170	40
2	Texas State Oil Co.	Cauble-2	200+	16
3	Humble Oil & Refg. Co.	Graig-1	210	21
4	W. L. Baker	Wells et al.-1	270	84
5	Tenneco Oil Co.	Clyde Robeson-1	200	150
6	J. L. Myers Sons	W W Flynn-1	220	152
7	Pel-Tex Petr. Co.	Thomason-1	270+	213
8	Sunray Dx. Oil Co.	Welson Wilson-1	170	243
9	Falcon Oil Petr. Co. & James Papadakis	et al.-1	180+	9
Madison County:				
1	Standard Oil Co. of Texas	Winnie Hightower Colwell-1	175	37
2	Cico Oil & Gas Co.	Fergusson C. D.-1	165	34
3	Woodley Petr. Co.	Hages-1	170	10
4	Woodley Petr. Co.	Forrest-1	175	9
5	Woodley Petr. Co.	Fannin Cannon Unit-1	210	6
6	Woodley Petr. Co., Johnston Oil & Gas Co. Signal Oil & Gas Co.	McWhorten-1	100	8

WELL	COMPANY	NAME	NET SAND (feet)	Q-NUMBER
7	Merrit Oil Co.	Gustavus-1	280	2
8	J. B. Stoddard	Tinkle-1	200	17
9	Humble Oil & Refg. Co.	Harrison-1	110	25
10	Sun Oil Co.	Jas Fannin-2	130	44
11	Lem Dunn	Jackson-1	200	47
12	Pan American Co.	Chambless-1	115	50
13	Ralph Johnston	Grisham Unit-1	185	53
14	Lone Star Prod. Co.	Hill et al.-1	190	63
15	J. M. West	MC Mahan-1	130	68
16	British American Oil Prod. Co.	Wakefield-B-2	160	71
17	Trice Prod. Co.	Skains-1	180+	79
Montgomery County:				
1	Superior Oil Co.	McWhorter-B-1	0	45
2	Superior Oil Co.	Dean-A-1	0	139
3	Superior Oil Co.	Brown-1	0	144
4	Amerada Petr. Co.	Godejohn-1	0	110
5	Humble Oil & Refg. Co.	Tex Long Leaf Lbr. Co.-1	0	143
6	Superior Oil Co.	Frost-5	0	135
7	Garvey et al.	Hora-1	30	280
8	The Texas Co.	Sealy Smith-1	45	285
9	G. W. Strake	Jones et al.-1	20	325
10	Continental Oil Co.	Foster-1	5	326

WELL	COMPANY	NAME	NET SAND (feet)	Q-NUMBER
Nacogdoches County:				
1	Humble Oil & Refg. Co.	Mast et. al.-1	35	31
2	Humble Oil & Refg. Co.	Mast-1	25	13
3	Southland Paper Mill Inc.	Angelina Co. Lbr. Co.-4	0	7
4	Southland Paper Mill Inc.	Cox-1	0	9
5	Layne Texas Ltd. & Southland Paper Mill	Carizzo Wilcox-9	0	41
6	Layne Texas Co.	Nacogdoches WW-8	25	119
7	Layne Texas Co.	Nacogdoches 7	32	118
Polk County:				
1	Mayo et al.	Texas Long Leaf Lbr. Co.-1	15	18
2	Humble Oil & Refg. Co.	Wittfoth-2	0	99
3	Woodley Petr. Co.	Edmonds-1	0	62
4	Sinclair Prairie	Jones-1	0	65
5	Texas Coastal Oil Co.	Leggett-1	15	199
6	Continental Oil Co.	Carter-B-1	0	202
7	Albert Plummer	Pierce-1	0	194
8	Lightfoot et al.	Davidson-1	0	33
9	J. Z. Werby	Saner-Ragley Lbr.-1	18	56
10	Jack Frazier	Beroman-2	0	61
11	Jordan Drlg. Co.	Lynch Davidson-1	12	122
12	Wilbur Thomas	Clancy-1	35	128
13	C. E. Gates	Jackson-1	55	129
14	American Liberty Oil Co. & Webb & Knapp	Cameron Heirs-1	15	187
15	Producers Inv. Corp. & Webb & Knapp	Saner-Ragley Lbr. Co.-1-A	18	191

WELL	COMPANY	NAME	NET SAND (feet)	Q-NUMBER
Sabine County: (not in Fig. 1)				
1	Coline Oil Corp.	Temple Lbr. Co.-1	0	8
2	Delta Drlg. Co. & Pineland Co.	Ridge Est.-1	0	24
San Augustine County: (not in Fig. 1)				
1	Continental Oil Co.	Long Bell Lbr. Co.-1	0	4
2	Carter Jones Drlg. Co.	Long Bell Pet Co.-1	0	9
3	Combro Oil Co.	Anderson-1	0	16
4	Lester & Culberston	Childers-1	0	3
5	Roper & Todd	Long Bell-2	0	1
San Jacinto County:				
1	J. W. Oliphant	Gibbs-1	50	57
2	Thomas Oil & Gas Co.	Carey Haley & Manning Lbr.-1	40	56
3	Humble Oil & Refg. Co.	Foster Lbr. Co.-1	45	55
4	Butcher Arthur Inc.	Jones-1	0	107
5	Mac Drlg. Co.	Payne-1	0	68
6	Sun Oil Co.	Gibbs Bros-1	0	63
7	F. Manning Inc.	Central Coal & Coke-1	0	74
8	Stanolind Oil & Gas.Co.	Falvey-1	0	51
9	Continental Oil Co. & C. D. Speed, Jr.	Frost Lbr. Co. -1	0	38
10	Magnolia Petr. Co.	Dixon-Falvey-2	0	46

WELL	COMPANY	NAME	NET SAND (feet)	Q-NUMBER
11	Magnolia Petr. Co.	Hinchliff-Sins-1	0	8
12	James Fuller & Assc.	Foster Lbr. Co.-1	0	36
13	Atlantic Ref. Co.	White-1	0	80
14	San Jacinto Co.	A. Plummer & Sttegast-Hrs-1	10	4
15	Humble Oil & Refg. Co.	Gibbs-1	60	6
16	Stanolind Oil & Gas Co.	Roberts-1	0	43
17	Woodley Petr. Co. Kirby Petr. Co., Jordan Drlg. Co.	Cummings-1	0	53
18	The Texas Co.	Foster Lbr. Co.-1	0	54
19	W. B. Frankel	F. Hogue-1	0	69
20	McDannald Oil Co.	Foster-1	0	90
21	Stanolind Oil & Gas Co.	Carey Land-B-1	70	132
22	Myles Prod. Co. W. L. Pickens & R. L. Wheelock	Ellisor-1	35	138
23	Stanolind Oil & Gas Co.	Langham-1	0	140

Trinity County:

1	Gejer-Jackson Inc.	Houston Co. Timber Co.-1	90	5
2	Magnolia Petr. Co.	Gibson-1	64	6
3	American Liberty Oil Co.	Due-1	80	8
4	P. R. Rutherford	Lawson-1	125	12
5	Magnolia Petr. Co.	Bolton-2	65	22
6	Pauley Petr. Inc. & McCulloch Oil Corp.	Cameron Heirs-4	75	15

WELL	COMPANY	NAME	NET SAND (feet)	Q-NUMBER
7	Gossage & Davis	Gibson-1	86	4
8	C. Bond et al., Bunn-Texas Drlg. Co.	Texas Long Leaf Lbr. Co.-1	60	10
9	Pan American Prod. Co.	Texas Long Leaf Lbr. Co.-1	106	13
10	J. G. Roberts Co.	Bain-1	65	27
11	Bradley Prod. Corp.	Crouch-Dilley Unit-1	120	35
12	Palm Petr. Col.	Cameron-5	35	39
13	Palm Petr. Co.	Cameron-1	25	40
Tyler County:				
1	General Crude Oil Co.	Mattie Wilson-1	0	17
2	L. Franklin et al.	Schlicher-Thomas Co.-1	0	25
3	Humble Oil & Refg. Co.	Denman-Kuntze-2-B	0	23
4	General Crude Co.	Mattauer-1	0	19
5	Justiss-Mears Oil Co.	Carter & Brother-D-1	0	39
6	Justiss-Mears Oil Co.	Carter & Brother-A-1	0	36
7	Justiss-Mears Oi. Co.	Carter & Brother-B-1	0	37
Walker County:				
1	Albert Pummer	Gibbs-1	140	12
2	Davis & DeLange	Gibbs Brothers-1	108	24
3	Standard Oil Co. of Texas	McAdams et al.-1	100	10
4	Magnolia Petr. Co.	Thompson Long Leaf Lbr. Co.-A-1	100	3

WELL	COMPANY	NAME	NET SAND (feet)	Q-NUMBER
5	Hawkins & Hawkins, Jr., et al.	Morris-1	100	39
6	Mike Hogg et al.	Wynne Est.	130	13
7	Mike Hogg et al.	Smith et al.-1	130	17
8	Union Prod. Co.	Smither-1	50	23
9	Tide Water Oil Co.	Newman Unit-1	62	22
10	Moran Oil Co.	Smithers-1	135	30
11	Moran Oil Co. & Garflo Oil Co.	Foster Est.-1	130	4
12	Hinkle Drlg. Co. & R. H. Abercrombie	Angier-1	82	1
13	J. M. Wren	Gibbs Bros-1	90	15
14	Ore & Jackson	Bishop-1	120	16
15	Gem Oil Co.	Belle et al.-1	55	21
16	Moran Oil Co.	Oliphint-1	82	32
17	Petro Nuclear Inc.	Gibbs Brothers & Co.-1	100	51
18	Woodley Petr. Co. & Stanolind Oil & Gas Co.	Heath-1	100	52
19	Robinson Oil & Gas Co.	Smithers-1	132	59
Waller County:				
1	Geo. W. Strake	Humphreys-1	48	96
2	Pan American Prod. Co.	Humphreys-1	30	93
3	The Texas Co.	Rice Inst.-1	15	16
4	Sun Oil Co.	Blucher-1	50	91
5	Skelley Oil Co.	Chapman-1	40	17
6	The Texas Co.	Caldwell-1	30	94

WELL	COMPANY	NAME	NET SAND (feet)	Q-NUMBER
7	Floyed Karsten	Menke-1	20	85
8	Humble Oil & Refg. Co.	Hardy-B-14	20	119
9	Sinclair Oil & Gas Co.	McDade-1	90	130
Washington County:				
1	R. J. Whelan	Solomon-1	260	37
2	Travis Oil Co.	Dallas-3	160	15
3	Humble Oil & Refg. Co.	Lauter-1	180	24
4	Western Nat. Gas	Bohne-1	75	47
5	Sinclair Oil & Gas Co.	Bess Henry-1	55	46
6	Union Sulphur Co.	Kubecza-1	70	45
7	Speed Oil Co.	Makowsky-1	144	2
8	Hunt Oil Co.	Pieper-1	60	38
9	Rutledge & Clark	Stzelke-1	35	43
10	Magnolia Petr. Co.	Anderson-1	144	41
11	Sun Ray	Lockhart-1	60	23
12	The Texas Co.	Jeske-1	175	27
13	Shell Oil Co.	Jackson-1	130	29
14	Phillips Petr. Co.	Priesmeyer-1	70	34
15	Champlin Refg. Co.	Dallmeyer-1	240	36
16	Marr & Witco	Lakmert-1	130	39
17	John Mayo & Foretich *et al.*	Parker-1	120	58

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